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THE
AMERICAN COTTON INDUSTRY

THE AMERICAN COTTON INDUSTRY

A STUDY OF WORK AND WORKERS, CONTRIBUTED
TO THE *MANCHESTER GUARDIAN*

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OF THE STANFORD JORD
UNIVERSITY

T. M. YOUNG

WITH AN INTRODUCTION BY
ELIJAH HELM, M.A.
SECRETARY TO THE MANCHESTER CHAMBER OF COMMERCE

LONDON
METHUEN & CO.
NEW YORK: CHARLES SCRIBNERS' SONS

1902
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P R E F A C E

THE publication in volume form of this imperfect study of the American Cotton Industry affords the Author a welcome opportunity publicly to thank those friends in England and in the United States who assisted him in his investigations. Nothing could exceed the liberality and courtesy with which American manufacturers and others admitted him to their mills and talked to him of their business, knowing, as they did, that everything they said and disclosed might be 'used against them.' This debt of gratitude he cannot himself hope to repay; but if any information in this book should prove to be of value to English manufacturers, he hopes that they will consider it a gift from America, and return it in kind when American manufacturers come to England upon a similar errand. The Author can say without affectation that any merits which his book may have are due to these American and English friends, and that its many shortcomings are due to himself.

MANCHESTER,

July 31, 1902.

CONTENTS

	PAGE
INTRODUCTION, by Elijah Helm, M.A., Secretary of the Manchester Chamber of Commerce	xi-xvi

CHAPTER I

Fall River, Massachusetts—Climate and water-power—Extent and variety of manufactures—Mixed population—Trade-unionism—Massachusetts factory laws and public holidays—The Fall River 'Ironworks'—Mill construction and insurance—Cost of buildings and machinery—English and American looms—Taxation—Wages and distribution of labour—Labour-saving <i>versus</i> cotton-saving—Quality of American print-cloth	i-13
---	------

CHAPTER II

New Bedford—From whaling to cotton—A typical fine-spinning mill—Electrical warp-stop motion—Electric driving—Wages for fine spinning and fancy weaving at New Bedford—Cost of ring frames—Fine spinning and fancy weaving at Fall River—Ingenious machinery and elaborate fabrics—A Lancashire weaver's experience—An older mill—Bad atmosphere—An odd spectacle	14-20
--	-------

CHAPTER III

A Rhode Island mill—The Northrop automatic loom—A magnificent weaving-shed—134 weavers to 2,000 looms—'Half-timers' and child labour—Work and wages—The loom-shops at Hopedale—The Queen City mill, Vermont	21-26
---	-------

CHAPTER IV

- Lowell, Massachusetts—The Merrimack River and its services
 —Comparative production of spindles in Massachusetts and
 Alabama—A drawing-in machine—Warping: a Lancashire
 contrast—The 'Standard List'—Six tapers to eleven
 machines—Automatic and semi-automatic looms—Compara-
 tive production and weaving prices—Loom-fixers and their
 work—Overseers—Workmen's homes and working mothers—
 An economic curiosity - - - - - 27-33

CHAPTER V

- Manchester, New Hampshire—A 'garden city'—Gigantic mills—
 Water-power and coal—Freight rates to Boston and New
 York—Wages at Manchester—'Unions' and 'ginghams'—
 A mill boarding-house—Middle-class comfort and cheap food
 —Lake Massabesic - - - - - 34-41

CHAPTER VI

- Maine—Successful competition with Lancashire—Magnificent
 waterfall—Smokeless soft coal: consumption and cost—
 Systematic 'time-cribbing'—Mule-spindles and rings—Piece
 rates and earnings—Sheetings, drills, and jeans—Percentage
 of imperfect cloth—Best climate for weaving drills—Mill
 boarding-houses and cottages—Migratory labour—Brunswick
 and Lisbon—Cheap power—The 'Harriman' automatic loom
 —Warp stop-motions and the quality of warps—An experi-
 ment that failed—A singular community - - - - - 42-52

CHAPTER VII

- The South—Conflicting opinions on Southern competition—An
 old Moravian settlement in North Carolina—The industrial
 awakening—An ingenious warp-dyeing machine—A journey
 into the wilderness—The 'accommodation' train—Cooleemee
 —A new mill village—Modern machinery and low piece
 rates—Southern weavers and the Northrop loom—Wages at
 Cooleemee—'No labour laws, no schools'—Cost of a
 Southern mill - - - - - 53-63

CHAPTER VIII

- Rapid growth of the cotton industry in the Charlotte district—
 Charlotte to Columbia—White children at work, black at

CONTENTS

ix

PAGE

play—Columbia, South Carolina—A magnificent cotton mill and its cost—Difficulty of obtaining competent labour—Why negroes are not employed in the mills—Wages at Columbia—A country mill in South Carolina—Wood fuel—Day and night shifts—Children 'always falling asleep'—Indirect employment of very young children—The Harriman loom and its cost—A weaver in fifty-six mills—His opinion of the Harriman loom—The chain gang and its counterpart	- - 64-75
--	-----------

CHAPTER IX

Augusta, Georgia—Municipal power canal—The King Mill labour dispute—A well-informed Baptist minister—His version of the quarrel—Character of the operatives—Visit to a strike commissary—The men's version—A determined resistance—The plan of campaign—Camping out by the Savannah River—The end of the strike—Work and wages at Augusta and the Horse Creek—The Enterprise Mill—Insurance and taxes—Raw material and freight	- - - - 76-88
--	---------------

CHAPTER X

Atlanta and its associations—'Up-to-dateness'—A race riot—A prosperous country mill—A mill at Atlanta—Dear power—The Northrop loom for drills—Wages at Atlanta—Cheap cotton—Attachment of employés—New Orleans—Louisiana factory laws—Climate of New Orleans—Manufacture of blue denims and cottonades—Liquid fuel—Dyeing lint cotton—Arrangement of carding engines—Piece rates and earnings—Low freight to New York—Workmen's dwellings	- - 89-98
---	-----------

CHAPTER XI

Cotton-planting in Louisiana—Planter and tenant farmer—Fertility of the Mississippi Delta—Maize on cotton plantations—Taxation of land and stock—Cost of producing a bale of 'benders' cotton—Finance—Anomalous transport charges—Bad packing—Character of the plantation negro—'Craps'—Negro wages and budgets—Superstition of the negro—Limits to the American cotton supply—An old planter's opinion—Scarcity of labour—Wanted, a machine	- 99-105
--	----------



P R E F A C E

THE publication in volume form of this imperfect study of the American Cotton Industry affords the Author a welcome opportunity publicly to thank those friends in England and in the United States who assisted him in his investigations. Nothing could exceed the liberality and courtesy with which American manufacturers and others admitted him to their mills and talked to him of their business, knowing, as they did, that everything they said and disclosed might be 'used against them.' This debt of gratitude he cannot himself hope to repay; but if any information in this book should prove to be of value to English manufacturers, he hopes that they will consider it a gift from America, and return it in kind when American manufacturers come to England upon a similar errand. The Author can say without affectation that any merits which his book may have are due to these American and English friends, and that its many shortcomings are due to himself.

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efforts to raise the rates of remuneration prevailing amongst their Southern competitors. Forces are thus at work which must in the long-run adjust the labour cost of production and remove this special advantage to the employers in the South, which is no less prejudicial to the cotton industry of the New England States than to our own.

The particular kinds of manufactures in which this competition is most effective are sheetings, drills, and jeans for the China market. Of these the increased exports from the United States present one of the most remarkable developments of the international trade in cotton goods during the past ten years, and there can now be no doubt that the movement is largely due to the prevalence of exceptionally low wages in the Southern cotton-mills. Other causes there are no doubt, such as the very cheap rates of freight at which merchandise is carried from New York to China in comparison with those charged from British ports to the same destination. This disadvantage to our own export trade with China has been almost entirely removed quite lately.

The measure of the competition of American drills and sheetings in the China markets with similar classes of goods made in England is strikingly indicated in the following statistical statement, showing the quantity of each kind delivered to the dealers for distribution at Shanghai in each year since 1892. In the returns of drills those of English and Dutch manufacture are not separately recorded :

DELIVERIES OF COTTON DRILLS AT SHANGHAI.

Year.		English and Dutch Pieces.			American Pieces.
1893	...	353,910*	...	...	526,301*
1894	...	291,978	...	...	611,603
1895	...	394,327	...	...	630,265
1896	...	320,603	...	...	1,014,041
1897	...	282,540	...	...	1,312,273
1898	...	238,958	...	...	1,521,240
1899	...	285,484	...	...	1,523,439
1900	...	211,366	...	...	635,128
1901	...	145,881	...	...	1,632,464

* Average of 1892 and 1893.

DELIVERIES OF COTTON SHEETINGS AT SHANGHAI.

Year.			English Pieces.			American Pieces.
1893	...	...	705,024	...	...	1,189,224*
1894	...	...	418,505	...	...	1,007,840
1895	...	...	483,952	...	...	1,025,322
1896	...	...	730,739	...	...	1,618,815
1897	...	...	685,509	...	...	2,261,362
1898	...	...	613,483	...	...	2,995,627
1899	...	...	748,324	...	...	3,540,314
1900	...	...	575,352	...	...	1,699,949
1901	...	...	494,143	...	...	3,185,951

But there is a further very important difference between British and American manufacturing methods to which Mr. Young has wisely drawn special attention—the extensive use in the United States of the ‘automatic’ loom. His investigation of the subject leaves no room for doubt that the employment of this weaving machine confers very great advantages on the industry. It substantially reduces the cost of production, and at the same time increases the earnings of the weaver, because it lessens the amount of energy and attention required from him per unit of production. Looms of this type are made and worked not only in America, but also in Germany, Austria, France, and Belgium. England alone is conspicuous among the great cotton manufacturing countries by the absence of this modern machine.

So singular a position is in no way to be attributed to apathy or neglect on the part of the English cotton industry. It is the result of an idiosyncrasy of British Patent Law which has unquestionably prevented the textile manufacturers of this country from having the opportunity of introducing this invention into their establishments. There is good prospect, however, that before long they will have ample choice of various types of automatic looms which will enable them greatly to reduce the cost of production, and at the same time to largely increase the individual earnings of the workpeople. Indeed, the conviction that some kind of automatic loom is indispensable is fast spreading amongst

* Average of 1892 and 1893.

Lancashire cotton manufacturers, and the only question remaining in their minds is that of determining which type is most likely to suit their requirements, having regard to its cost and its efficiency. Little apprehension need be entertained on the ground that, although the individual incomes of weavers will be augmented, some must be for a time thrown out of employment, for, in the first place, the change cannot come suddenly—that is a physical impossibility. The transition will necessarily be gradual, and its effect is more likely to involve for a time a pause in the training of new weavers than in the enforced idleness of old ones. There is obvious weight in Mr. Young's remark that, although there are now 85,000 automatic looms running in the United States, the demand for weavers is greater than ever. Such, indeed, is the experience in every department of industry in which labour-saving machinery has been adopted. The workpeople meanwhile will receive from their representative on the recent deputation an accurate statement of his own observation of the advantage of the improved loom. It may be confidently expected also that other differences between American and English mechanical and administrative mill methods will be fully discussed by both employers and workpeople, and that their conferences separately, and perhaps jointly, will bear good fruit, greatly to the advantage of the British cotton industry.

ELIJAH HELM

THE AMERICAN COTTON INDUSTRY

CHAPTER I

Fall River, Massachusetts—Climate and water-power—Extent and variety of manufactures—Mixed population—Trade unionism—Massachusetts factory laws and public holidays—The Fall River 'Ironworks'—Mill construction and insurance—Cost of buildings and machinery—English and American looms—Taxation—Wages and distribution of labour—Labour-saving *versus* cotton-saving—Quality of American print-cloth.

MILL-WHISTLES blowing in the cold, wet mist of an April morning awakened me to Fall River and the cotton industry of New England. But yesterday evening the steamship *Plymouth*, flooded with music and electric light, and appointed with almost every comfort that a luxurious people can command, had cast off from her pier at New York, and, passing under Brooklyn Bridge, had threaded her way through the tortuous and crowded East River out into Long Island Sound. Within a few hours we had seen natural replicas of the Thames below London Bridge, the Mersey at Liverpool, and a little bit of Portsmouth Harbour. Our last glance, before turning in for the night, might have been—but for the absence of mountains—upon the land-locked and moonlit waters of Loch Fyne. Yet morning found the *Plymouth* not at Inverary, but at Fleetwood—yes, in this mist, Fleetwood exactly, with its early-morning desolation, its dull damp air, its drizzling

rain. The mill-whistles of Fall River did not dispel, but rather completed the illusive association, for to most of those who come there Fleetwood in the early morning is but a gateway into workaday Lancashire.

Fall River is Lancashire in epitome. It has a climate more nearly resembling the climate of Lancashire than any other town in the United States. Its winters, like ours, are tempered by the Gulf Stream; its summers by the breezes from Mount Hope Bay, Narragansett Bay, and the ocean. Like Lancashire, it has an abundance of what Lancastrians, with a fine philosophy, call 'good weaving weather.' The whole year round its atmosphere has a mean humidity of over 74 per cent., with a maximum variation of about 24 per cent. The mean variation in humidity between 7 a.m. and 3 p.m. is 10 per cent., and the mean temperature for the whole year is 40° F. To this climate, to the water-power derived from the Fall River (the outflow of a chain of ponds two miles above the bay), and to its excellent harbour, Fall River owes its pre-eminence amongst the cotton manufacturing centres of America. Here are established 41 corporations (a joint-stock company is always a corporation in America), with an incorporated capital of \$24,000,000 (probably representing an investment of \$47,000,000), owning 87 mills and employing 30,000 hands. The mills contain over 3,000,000 spindles and nearly 76,000 looms, and are converting 370,000 bales of cotton into 866,000,000 yards of cloth every year. They pay in wages \$215,000 a week, giving an average wage of over \$7, or 29s. Fall River, therefore, spins and manufactures annually nearly as much American cotton as is landed at the Manchester docks.

The first cotton mill at Fall River was built on the side of the stream in 1813, and was driven by a water-wheel; and for the next fifty or sixty years every mill built was placed by the side of this remarkable water-power—remarkable for the constancy as well as for the speed and volume of its flow. Some thirty years ago all the suitable sites on the Fall River had been occupied, and since then the mills have been built beside the ponds and along the harbour. Few, if any, of the Fall River mills are now driven exclusively by water. Turbines have taken the place of the old breast-wheels, and the improvements of the steam-engine

have led to the adoption of steam, in some cases as an auxiliary, in others as the sole driving-power.

New England contains two-thirds of all the cotton spindles and three-fourths of all the looms in the United States, and makes about four-fifths of all the print-cloths (plain calicoes) manufactured in the country. The local statisticians boast that Fall River alone has more than one-seventh of all the cotton spindles in the Union and nearly one-fourth of those in New England, and manufactures over three-fourths of all the print-cloths. It has more spindles than any state except Massachusetts (in which it is), as many as all the Southern States could muster until a few years ago, and twice as many as any other city in the United States. It claims to produce two miles of cloth in every minute of every working day in the year. Its mills, although mainly employed in the manufacture of print-cloth, make every sort of cotton textile, from rough shoe linings to the finest dress materials—twills, jeans, satteens, lawns, leno and lappet cloths with silk weft, fine zephyrs, lace curtains, and crochet and Marseilles quilts. And Fall River not only spins and weaves these fabrics, but bleaches, prints, and finishes them. Its industries support a population of 105,000 people, of whom the last census showed only about 15,000 to be of American parentage. Of the rest, 15,000 are English, 25,000 Irish, 30,000 French Canadian, 5,000 Portuguese (mainly from the Western Islands), and about 15,000 of Armenian, Russian, Italian, or other foreign parentage. This mixed population is an important factor in the economic condition of the cotton trade.

But for the intervention of the Massachusetts Legislature the mill hands at Fall River would be in a hard case. The constant flow of immigrants from Europe and from Canada, many of whom cannot speak or understand English, makes any efficient union of labour in the cotton mills impossible, and an added difficulty is the rapid movement of labour, not only from place to place, but also from trade to trade. The mule-spinners alone—mule-spinning being a highly skilled craft—are well organized; but mule-spinning is being gradually abandoned by American mills in favour of ring-spinning, for which cheap and comparatively unskilled labour can be employed.

'The mule-spinners,' said one mill superintendent to me, 'are a tough crowd to deal with. A few years ago they were giving trouble at this mill, so on Saturday afternoon, after they had gone home, we started right in and smashed up a room-full of mules with sledge-hammers. When the men came back on Monday morning, they were astonished to find that there was no work for them. That room is now full of ring frames run by girls.'

In this way the position of the Mule-Spinners' Union, which would otherwise be exceeding strong, has been seriously undermined. At present, thanks to the prosperity of the cotton trade, wages are good and employment plentiful. But it seems that in times of depression the 'help,' as they are called here, must be almost at the mercy of their employers.

What the State of Massachusetts has done for the betterment of factory life has been explained to me by Mr. Rufus C. Wade, a gentleman who is at once the Chief of the Massachusetts District Police, Chief Inspector of Factories, Workshops, and Public Buildings, and Fire Marshal. He has a staff of twenty-six inspectors, two of whom are women, employed exclusively in connection with textile factories, and their duties are to see that machinery is properly fenced, to look after the safety of elevators, to inspect the sanitary arrangements of the mill, to see that the means of egress in case of fire are adequate, and that all young persons under twenty-one years of age employed in mills have had or are receiving a proper elementary education, to prevent 'time-cribbing,' and to see that the 'particulars clause' (modelled on our own) is complied with, so that every weaver may be able to check the amount of his or her wages.

The hours of labour for women and minors in the State of Massachusetts are fifty-eight per week, and there are the following legal holidays: February 22, Washington's birthday; April 19, anniversary of Lexington and Concord; May 30, when the graves of the heroes of the Civil War are decorated; July 4, Independence Day; September (first Monday), Labour Day; November, Thanksgiving Day; December 25, Christmas Day. Mr. Wade tells me that the Fall River operatives are going to ask their employers for a

week's general holiday in July, and he thinks that they will probably get it.

The 'particulars clause' which I have mentioned differs from ours in allowing the employer a margin of 5 per cent. in the length of the cuts; that is, the employer may agree to pay 20 cents per cut of 50 yards, and require the weaver to weave $52\frac{1}{2}$ yards for 20 cents. A Bill had been brought before the Massachusetts Legislature to reduce this margin to $2\frac{1}{2}$ per cent., and Mr. Wade told me that there were good prospects of its passing. No child under fourteen years may legally work in a factory, in any capacity, in this State, whether as an employé of the firm or as an assistant to its parents. Children over fourteen who cannot read or write simple sentences must, if they work in the daytime, attend a night-school until they can read or write, or, failing that, until they are twenty-one years of age. Such children are provided with attendance tickets, which are punched at the school and must be shown to the factory inspector on demand. Birth certificates are not required to prove the age of children, but the parents must sign a sworn statement.

There is no statutory standard for the temperature or humidity of the air in Massachusetts cotton mills, but the inspectors have power to make tests and to order improvements. In school-houses and public halls the Department requires that 1,800 cubic feet of fresh air per person per hour shall be admitted, and aims at a standard of 10 volumes of carbonic acid gas in 10,000 volumes of air as a maximum. In practice, Mr. Wade assured me, this standard is found to be unattainable even in the schools. In the mills the air is, as a rule, very bad, and there is often no provision at all for proper ventilation. In many mills I have seen the condensed moisture streaming down the windows, and clouds of water-vapour, almost scalding hot, rising amongst the looms from open grids on the floor. On the whole I should say that the conditions in which factory labour is performed, even at this temperate season¹ and in this model State, are very much more trying to human endurance and health than in Lancashire. Mr. Wade admitted that Massachusetts was still behind England in factory legislation, but he is a close

¹ April.

and discriminating student of our factory 'laws, and it is easy to see that his sympathies are with the workers and that he is trying to improve their lot.

Despite the seeming paradox, the largest of the great cotton mills at Fall River is the Fall River Ironworks. The Ironworks was formerly an ironworks in fact as well as in name, but long ago the foundry gave way to the spinning frame and the forge to the loom. The Fall River Ironworks Company is closely associated with the American Printing Company, whose works are also at Fall River. The Ironworks mills contain 266,512 ring spindles (no mules) and 7,660 looms, and employ 2,700 hands—surprisingly few when one considers the size of the establishment.¹ They make nothing but plain cloths—print-cloth 28 inches wide and a similar fabric 40 inches wide which, I understand, is not printed. At the printworks there are nineteen printing machines, whose combined output is said to be 75,000 50-yard pieces a week. This output, I am told, 'exceeds in the number of yards that of any other printworks in the United States or in Europe, and the cloth printed here in one year if spread out in a continuous line would encircle the globe three times, with 10,000 miles to spare.' Be that as it may, they are unquestionably very large works, and Mr. M. C. D. Borden, who controls both them and the Ironworks, is a paramount power in the cotton trade of Fall River. In the matter of wages he acts independently of the other manufacturers, who have sometimes been compelled to follow his lead when it was exceedingly inconvenient for them to do so. At the Ironworks mills about 47,000 bales of cotton are spun and 120,000,000 yards of cloth woven annually, the rate of production being about twenty-three miles an hour, or, say, the speed at which the *Oceanic* kicks out her broad white ribbon of foaming wake from Queenstown to Sandy Hook. Notwithstanding this enormous production, the Ironworks plant is about to be increased to 300,000 spindles and 10,000 looms, and that of the printworks to twenty-four machines. Mr. Hathaway, the superin-

¹ A cotton-mill at Salford (Manchester), containing about 135,000 spindles (mule and ring) and 3,000 looms, employs about 2,500 hands.

tendent of the Ironworks mills, who was kind enough to take me through them, told me that although the incorporated stock of the Ironworks company was only \$2,000,000, the total cost of the mills (excluding the printworks, which stood at \$750,000) had been between \$3,000,000 and \$4,000,000.

Cotton mills in America are nearly always equipped for both spinning and weaving, and the number of the spindles is proportioned to the requirements of the looms. The cost of mills is commonly expressed in dollars per spindle, and I was told that these Ironworks mills, including the buildings, turning-power, spinning and weaving machinery, and all accessories, had cost \$13.85, or, say, £2 17s. 9d., per spindle. The price of all building materials, but particularly of wood, has gone up since they were built, and a similar plant could not be laid down at Fall River to-day for less than \$15, or £3 2s. 6d., per spindle. The plant is driven by four triple-expansion engines, and the cost of engine fuel delivered at the mills is at present 13s. 6d. per ton.¹ Power is transmitted from the engines to the main lines of shafting by leather belts; rope driving is decidedly the exception in New England cotton mills.

Unlike our English mills, the mills at Fall River, whether built for spinning or for weaving, are nearly always four or more stories high. Most of them are built of granite quarried on the spot, but there are several built of red brick. None of the mills is fireproof as we understand the term; the floors are made of planks 4 inches thick, covered with 1-inch boards laid diagonally, and boarded over again with hard birch or maple, well screwed down, and these floors are supported by wooden pillars about a foot in diameter. The stairs also are of wood. This is known as the 'slow-burning' system of mill construction, and every precaution is taken, by the installation of automatic sprinklers and fire-pumps and in other ways, to minimize the risk of damage by fire. Nearly all the mills are insured with one or other of nineteen mutual insurance societies, whose businesses are concentrated in a single building at Boston under the direction of Mr. Edward Atkinson, the well-known economist. These societies have thrown the whole of their energies into

¹ *I.e.*, per 'short' American ton of 2,000 pounds.

the work of preventing fires. They have their own laboratory, in which every kind of mill appliance or commodity which might affect the safety of buildings is tested; and in conjunction with the Massachusetts Institute of Technology they have set up standards for mill construction and furnishing which are now almost universally accepted in the United States. I believe that the standard pattern Underwriter pump, now so largely used in England, was designed by the engineers of these associated societies. The net effect of their policy is that the cost of insuring a properly constructed slow-burning cotton mill, such as I have described, is now less than one-tenth of 1 per cent. As an example of the speed with which buildings of this kind can be run up, I was assured by Mr. Hathaway and others at Fall River that in 1893 a new mill, four stories high, designed to contain 65,000 ring spindles and 1,710 looms, was built and roofed within a month, and that within nine months and two weeks following the laying of the foundations the whole of the machinery was at work.

The cost of mills like those of the Fall River Ironworks is little, if at all, higher than the present cost of good fire-proof mills similarly equipped in Lancashire. The machinery for preparation, spinning, and weaving costs much more than in Lancashire—probably about 50 or 60 per cent. more; carding engines, cotton combers, drawing frames, fly frames, slashers, and other kinds of textile machinery made in Manchester, Oldham, Accrington, and other Lancashire towns, are being sold in the United States to-day at the same prices as are paid for American machines, in spite of a 45 per cent. tariff and the further handicap of packing and transportation charges. Ring-spinning frames are not imported from England, but I understand that this is only because of the patents on the Rabbeth spindle, and that the question whether or not English spinning frames can now lawfully be imported into the United States will shortly come before the American courts. Few, if any, English looms are now to be found in American cotton mills, probably because the peculiar conditions of the American industry require a different kind of loom from that which is used in Lancashire.

The typical American plain-cloth loom is an under-pick

loom, and the greater strength of American iron castings enables it to be built more lightly than the typical Lancashire loom. The only machine work on an ordinary American loom is on the fork and fork slide, and the only turning is on the crank shaft. Mechanically, the American loom appears to be hardly so well constructed as an English loom of the better sort; the shafts are of less diameter, and the bearings of the crank shaft are without the cast-iron bushes which are now used almost universally in the Burnley district. The yarn beams have a positive let-off motion instead of the levers, weights, and ropes or chains, and the cloth is wound on a small iron roller which can be lifted out of the loom with the cloth upon it and then withdrawn from the centre of the roll. This seems to be a distinct improvement on the wooden roller upon which the cloth is wound in Lancashire, and from which it has to be pulled off by the weaver—sometimes while the loom is running. The American plain-cloth loom has a fast reed and a single-frog stop-rod. Whatever its shortcomings may be, it is thought good enough for its work. The price is \$40 (£8 6s. 8d.) for a loom of 31-inch reed space, capable of weaving 28-inch cloth, or \$56 (£11 13s. 4d.) for a 43-inch loom, capable of weaving 40-inch cloth. Narrow print-cloth looms have lately been sold in Lancashire for £6 apiece—a difference in price greatly in favour of the English loom.

Since the American, in spite of having to pay so much more for his machinery, can obtain a fully equipped mill for very little more than the cost in Lancashire, it is evident that the building is very much cheaper. The mills at Fall River are rated for local taxation at from \$17.20 to \$17.80 per \$1,000 on the value of the entire plant, which is assessed at two-thirds of its actual value.

The cloth made at the Fall River Ironworks is, as I have said, of two widths—28-inch and 40-inch. Both sorts contain sixty-four ends and sixty-four picks to the inch; the yarns are 28's twist and 36's weft (or, as the Americans say, 'filling'), and the length of the cuts is nominally 50 yards. The cotton spun here, as at most of the other mills which I visited, is of 'good middling' quality, 1-inch to 1½-inch staple. The intermediate and roving frames are

run more slowly than is usual in Lancashire, and very little twist is given to the roving. In the ring frames, however, plenty of twist is put in, and in this way a large proportion of short fibres are worked into the yarn. Ring weft is spun 'twist-way,' and for twist it is customary to reckon that the square root of the counts multiplied by 3.75 will give the proper number of turns per inch. Both twist and weft are harder spun than in Lancashire, and the result is a yarn that enables the maximum production to be obtained from the machines with the minimum of labour or attention, although at the expense of the appearance of the cloth. American print cloths are, in consequence, apt to be 'reedy' and bare.

The following prices were paid for labour at the Fall River Ironworks at the time of my visit. The spinning frames, containing 112 spindles per side, were tended by girls, who ran four, six, eight, or ten sides each, according to their dexterity. The average for good spinners was about eight sides (896 spindles), and the wages were $12\frac{3}{4}$ cents per side per day. This gives a weekly wage of 25s. 4d. for fifty-eight hours, or for 1,120 spindles 32s., as compared with about 17s. 6d. a week (fifty-five hours) for 800 spindles on similar counts in Lancashire. The production of the spindles at the Ironworks was from 1.125 pounds to 1.2 pounds of 28's twist per spindle per week, or 1.33 pounds of 36's weft. Winders were paid 19 cents for winding 56 pounds of 28's twist, and warpers 13 cents for beaming 100 pounds, and in spite of these low piece rates good wages were earned. Each warper here ran three warping mills without assistance, and some of the women were earning \$9, or 37s. 6d., a week, as compared with 21s., which is considered a good wage in certain parts of Lancashire, where the piece rate is nearly 50 per cent. higher. The slasher-tenters or tapers (men) were paid \$1.96 per day—say 8s.—which is not more than a good taper can earn in Lancashire. They ran one machine each, with the usual assistance, at a speed of 60 yards a minute. Warps are drawn into the loom harness by girls without the assistance of a reacher-in. For drawing in a beam of 1,780 ends they were paid $19\frac{3}{10}$ cents, and a girl whom I questioned told me that at this work she could make from \$8 to \$10 a week. She did not work full time—the strain on the eyesight was too severe for

that—but between seven in the morning and half-past four in the afternoon she could draw in eight beams one day and nine the next. Some drawers-in, she said, could do more. The piece rate for this work was again rather less than in Lancashire.

Most of the weavers at the Ironworks run eight of the narrower looms apiece without the assistance of a tenter. Weft, however, is brought to the looms for them, and the cloth is taken away. The looms are non-automatic, and have no warp-stop motion; but there are very few warp breakages, in spite of the way in which the looms dance and jump upon the wooden floors. This comparative immunity from breakages is, of course, due to the quality of the warps. Ring weft is used throughout the mills, and the cloth produced is a good, strong fabric, although, as I have said, not so full or well covered as a good Burnley 'printer.' This bareness is a disadvantage when the cloth comes to be printed. The looms run at 204 picks per minute (except 100, which run at 223 picks), and the eight-loom weavers produce on an average forty-eight cuts per week of fifty-eight hours. The price paid per cut (50 to 52½ yards) was 22½ cents—the highest rate paid here for several years. Not long before it had been only 16 cents. The eight-loom weaver could earn, therefore, at the present rate, about \$10.80, or 45s. per week; but this wage would be liable to heavy deductions for spoilt work. Loom fixers or tacklers were paid \$1.38 per 100 cuts turned out by the looms under their charge, and most of the fixers were running 176 or 180 looms apiece. There were, however, two fixers at the Ironworks who ran 217 looms each. Such a thing is, so far as I know, unparalleled in Lancashire.

Any of my readers who may have had the patience to follow me through these tedious but essential figures will doubtless perceive a certain radical difference between what I may call the policy of the New England manufacturer and that of the Lancashire manufacturer. Compared with the Lancashire standard, the mill labour obtainable at Fall River is dear and bad—dear because America is now riding on the top of a wave of commercial and industrial prosperity, employment is plentiful, and the standard of expenditure for every class is high; bad because everybody

there is climbing up the social ladder as fast as he can, and the cotton industry, being one of its lowest rungs, receives the beginners. Even a good mill in New England loses 5 per cent. of its workpeople every week, and has to find substitutes. There are towns in Massachusetts whose cotton mills thirty or forty years ago were filled with American-born workpeople of a very good class, earning wages higher than are paid even to-day. As wages gradually fell by successive 'cuts' to the low level of 1898 these towns were swept by waves of foreign invasion. Weavers from England and Scotland first drove out the Americans, only to be driven out in their turn by an army of Irish. The Irish began after a while to be troublesome, and crowds of French Canadians were summoned from over the border to take their places. Even the docile 'Kanucks' have now given way in some places before the invasion of Portuguese, Greek, and Syrian immigrants, and the mill superintendents are wondering what will come next. I have seen in some mills notices printed in four languages and orders given by gestures or through interpreters. The labour displaced by immigration rises to better things, and the expansion of American industry provides at present openings for all.

This digression may serve to explain the seeming paradox that the highly-paid labour of Fall River is not so highly skilled as the less highly-paid labour of Lancashire. Labour, then, being dear and not very good, and machinery being dear also, the American cotton manufacturer has been compelled to devise means of economizing both, of relieving labour of those duties which require the most skill, of making a little dear labour go a long way, and of getting the maximum amount of work out of his dear machinery. He has found that the only possible way of doing all this is by using a better, and of course a dearer, grade of cotton, and he uses it. I will venture to affirm that if some New England mills which I have seen had to work with the short-stapled cotton of which so much is spun in Lancashire, they would be in hopeless difficulties at once. It is possible that when all the conditions are considered the American policy of economizing labour at the expense of cotton (and I may say here that the waste of cotton in American mills would appal a well-trained Lancashire manager), and the

Lancashire policy of economizing cotton at the expense of wages, may be equally sound for the respective countries. I do not say that America has nothing to learn from Lancashire, or Lancashire nothing to learn from America; each, I believe, can teach the other a good deal. But the point at which the balance should be struck between the economy of labour and the economy of cotton is not one and the same for both. The product of the American system is a cloth which is, on the whole, distinctly inferior in appearance, 'feel,' and finish to that produced by the Lancashire system. To equal a Lancashire cloth in these respects an American cloth must not only be made of better cotton, but must contain more of it—perhaps 5 per cent. more. To this rule of inferiority there are, it is needless to say, exceptions—notably some of the American drills made for the China market. But the American home market, which absorbs nearly the whole of the product of American looms, is less exacting in these matters than the markets in which Lancashire cloths are sold. The question for our manufacturers is: How far may American methods, with all that they imply, be profitably introduced into Lancashire?

CHAPTER II

New Bedford—From whaling to cotton—A typical fine-spinning mill—Electrical warp-stop motion—Electric driving—Wages for fine spinning and fancy weaving at New Bedford—Cost of ring frames—Fine spinning and fancy weaving at Fall River—Ingenuous machinery and elaborate fabrics—A Lancashire weaver's experience—An older mill—Bad atmosphere—An odd spectacle.

A FACTORY town whose mills use sea-water for condensing, whose workpeople, before the foreign invasion, possessed each his own boat and fishing-tackle, whose streets are avenues of well-grown trees—such is New Bedford. Once the greatest whaling port in the world, it sent its ships into every sea, and boasted that in proportion to its modest population it was the richest city in the United States. The whalers are all gone now, and the talk at the street corners and in the saloons is no longer of blubber and whalebone and voyages to the Southern Ocean; the subjects discussed now would be quite in order at Bolton. But so long as there are quays and schooners at New Bedford, the salt flavours of the old seaport will never wholly disappear. Dungaree and oilskins and sea-boots may still be bought in the shops near the harbours, and within a biscuit's throw of 'Professor Wall's Boot-blackening Parlors,' which may stand for an example of the landsman's finicking and luxurious habits, you may yet hear the ring of the ship carpenter's hammer, watch a new fore-topmast being fitted to an old fore-and-aft schooner, or see a cutter-load of very free-and-easy American man-o'-war's men being pulled off, after a night's shore leave, to a gunboat at anchor in the harbour.

Close beside the harbour stands a mill which may be taken as a type of the most modern fine-spinning mills in

New England. The equipment, when I saw it, was not yet complete, although more than a year had passed since the work of building began ; but part of the machinery was running. The buildings are of brick, and are designed after the English rather than the American plan, in that the spinning and weaving departments are in separate buildings and the weaving shed is lighted from the roof. The spinning mill is a four-story block with wooden floors and pillars such as I have already described, and the height of the rooms from floor to ceiling is 17 feet 6 inches. The windows are made to open casement-fashion, and there are outside staircases of iron to give safe egress in case of fire. In this building there are, or were to be, 90,000 ring spindles, spinning 80's on the average, with the necessary machinery for preparation, some of which was of English make. The weaving-shed stands alongside the spinning mill, not further away than is necessary to secure light for the lower windows of the mill, and is connected with it by a covered bridge. It has a basement, lighted by windows, and the shafting and drums from which the looms are driven are under the floor of the shed. The looms, 2,100 in number, were plain looms and dobbies, from 36 inches to 40 inches reed space, and were intended to weave fine lawns, cambrics, and fancy goods. The cost of the plain looms was \$58, say £12 5s. each, whilst every twenty-stave dobby loom had cost \$91, or nearly £19. They were all to have an electrical warp stop-motion, which was to cost about five guineas a loom extra. The condition of the air in the weaving shed was to be regulated by two gigantic humidifiers, and the walls and ceilings of both mill and shed were painted white with enamel paint.

The engine-house, as I saw it, contained a high-speed engine of 2,000 horse-power directly coupled to a 1,700-horse-power Schenectady alternating current generator working at 600 volts. Space had been left for duplicating this plant. The current was carried to motors which drove the lines of shafting (none more than 3 inches thick) in every room independently, and I was informed that the installation of electrical machinery had added over £2,000 to the first cost of the driving plant. Steam was raised in seven boilers, fitted with mechanical-stoker furnaces, so that one fireman

could attend to all, and the cost of coal was 15s. 6d. per short ton. The city of New Bedford supplies fresh water for mill purposes at $2\frac{1}{2}$ cents a thousand gallons; the water for the condensers is drawn from the harbour.

The total cost of the mill, complete, was to be \$1,250,000, or over a quarter of a million sterling. This works out at a fraction less than \$14 per spindle for the whole plant, and includes \$15,000 paid for the 6 acres of land upon which the mill stands.

The first cotton was being spun into 60's and 70's twist when I visited the mill; it was of $1\frac{1}{2}$ inches to $1\frac{7}{8}$ inches staple. In the card-room I noticed girls minding a pair of roving frames (240 spindles each), and in the spinning-room some had twelve sides of 112 spindles each and others ten sides of 128 spindles each. The wage paid on the shorter frames, spinning 60's, was 72.69 cents (say 3s.) per side per week. The warping mills here had a cone drum differential motion for varying the speed, and the warpers each ran three of them. The slashing machines had positively driven cylinders, an arrangement intended to relieve the wet warp of tension, but by no means universally approved; they could size 400 50-yard cuts of 1,700 ends a day, and the men who ran them were paid 50s. 6d. a week.

At another fine-spinning and weaving mill at New Bedford I found 100,000 spindles, and 3,200 looms weaving fancy goods, some wholly of cotton, some of silk and cotton. The ring-spinners were minding 1,200 spindles each, and were paid 37s. 6d. a week; the mule frames had two joiners, also paid 37s. 6d. a week, each of whom was attending to 1,000 spindles. The finest counts used in this mill were 140's ring twist and 240's mule weft. Thirteen-hank roving is used for 60's ring twist, 18-hank roving for 80's ring twist, 22-hank roving for 125's ring weft, and 28-hank roving for 150's ring weft. The cost of the American ring frame as used in these mills is \$3 (12s. 6d.) per spindle, delivered and fitted up ready for use. In this mill two warpers and one creeler were in charge of eight warping mills which were running at a speed of 50 yards a minute. The warpers were receiving 40s. 1d. a week and the creeler 23s.

New Bedford, which so far as fine spinning is concerned is the Bolton of America, is a town of 65,000 inhabitants.

Its prosperity may be gauged by the fact that 5,000 new looms, with spindles to supply them, were to be started this year (1902). One new mill had just ordered about £60,000 worth of textile machinery from Manchester. But New Bedford is indebted to Lancashire for more than machinery. In nearly every mill one finds Englishmen in responsible positions—sometimes in supreme charge; and Mr. C. P. Brooks, the head of the textile school there, which is one of the best equipped and most successful in the United States, was brought from Manchester to direct it.

Although pre-eminent in fine-spinning and weaving, New Bedford has no monopoly of this branch of the American cotton industry: there are several mills at Fall River and in Rhode Island and Connecticut which produce yarns and fabrics almost as fine as those of New Bedford. The Granite Mills at Fall River contain 43,000 mule-spindles, 77,000 ring-spindles and 3,090 looms, employ 1,150 hands, and manufacture 'dobbies' and plain cloths, including many goods with yellow silk weft. Silk weft up to 400's and cotton weft up to 150's were being used in the manufacture of very beautiful and elaborate fancy cloths when I visited the mill. Some of these were combinations of a satin stripe, a thick cord, a leno and a lappet, requiring three beams at least. An expert Lancashire weaver has told me that the lappet motion used here is better than anything he has ever seen in England. The lappet needles are worked from the top instead of from underneath, and the 41-inch lappet looms were running at 150 picks a minute. The weavers here were running four dobby looms each—two lappet and two plain—and were earning as much as 50s. a week.

One weaver to whom I spoke was a Darwen man. He told me that he was fifty-two years of age, and had been in America three years. His earnings from four looms were between \$11 and \$12 a week, and since he came over he had been able to save \$200, which were now in the bank. His house cost him 10s. a week, but he did not find other necessary expenses much greater than at Darwen, although there was at Fall River a higher standard of unnecessary expenditure. 'Many weavers,' he said, 'fling money about.'

'This is the right side of the water,' he cried into my ear through the din of the looms.

'Do you mean better to live in?' I replied.

'No,' was the answer, 'better for making money. I would sooner live in England, and if I can save enough to keep me out of the mill, I'll go home before I die.'

At another mill where there were over 96,000 spindles and 2,000 looms on similar work—lappets, lenos, and jacquards—I found that the average earnings of a weaver were £2 a week, and that ring-spinners tended 1,300 spindles for 29s. 2d. a week. A number of satteen looms were fitted with an electrical warp stop-motion, invented by an Englishman from Saltaire, which enables one weaver to run twelve looms. I was told that the most skilful weavers here were from England, but that the Englishman gets himself into trouble by 'pulling the chestnuts out of the fire' for the other workpeople. English weavers are therefore not regarded by the employers with that degree of favour which their excellence as workmen would otherwise command. There were at this mill 750 lappet looms and 120 jacquard looms, and 50 more jacquard looms were on order. Learners are given four looms from the first, and piece rates are calculated at an amount sufficient to give a competent weaver \$10 a week on a production equal to 80 per cent. of the theoretical maximum.

At the Chace Mill, Fall River, there are 80,400 ring-spindles (all the mules having been discarded during the past fourteen years) and 1,900 looms employed in the manufacture of print-cloth, twills, and wide goods such as window-blinds. All but 150 of the looms are from 43 inches to 56 inches wide. About 10,000 bales of cotton are spun, and 26,000,000 yards of cloth woven, annually. The counts spun are 28's to 30's for twist, and 36's to 48's for weft, and the cotton used is 'strict good middling' of $1\frac{1}{8}$ inches to $1\frac{3}{16}$ inches staple. The production of yarn is 93,000 pounds per week, but to attain this some of the spinning frames are kept running until ten o'clock at night.

In the blowing-room the labour was performed by Portuguese workmen, who were paid \$7.26 (30s. 3d.) per week; the 'boss picker' received \$11 $\frac{1}{2}$, or say 48s. In the card-room each grinder attending to forty-eight cards was paid 45s. 4d. a week; for the same number of cards there were three strippers, each of whom was paid 36s. 6d. a week for

attending to sixteen cards. On the roving frames each girl had two sides, or 352 spindles, and the piece rate was $11\frac{1}{3}$ cents per hank, which gives a weekly wage of $\$11\frac{1}{4}$ to $\$11\frac{1}{2}$ (48s.) per week. For ring-spinning (whether twist or weft) the wage was $19\frac{1}{3}$ cents per day per side of 128 spindles; the number of sides which a good spinner could run on twist was six, and on weft eight, and the weekly earnings were therefore from 29s. for 768 spindles to 38s. 8d. for 1,024 spindles. When the frames were run at night different spinners were employed, and were paid for four hours' work (6 p.m. to 10 p.m.), but I do not know what, if any, precautions were taken to make sure that the spinners so employed had not been working during the day at another mill.

Winders were paid $24\frac{1}{2}$ cents for winding 62 pounds of 28's twist, and each winder ran seventy-six spindles. The warpers ran three mills each without assistance, and were paid $12\frac{1}{10}$ cents per 100 pounds of 28's twist. Tapers received $\$11.76$ (49s. 1d.) a week, and to every five machines there was an assistant at 30s. 3d. per week. The looms at the Chace Mill were not automatic and had no warp stop-motion, the superintendent being of opinion that the saving in wages effected by the use of automatic looms is in many cases insufficient to compensate for the heavy first cost of the looms and accessories. He cited one mill which had given an order for 1,800 of such looms, cancelled it after 500 had been delivered, and put in 1,300 ordinary looms instead. This opinion, however, was by no means general, and, judging from what I have myself seen and heard, I believe it to be misleading. The looms here were run at 180 picks per minute, and the weavers had eight apiece. They turned out weekly from each loom 300 yards of 40-inch cloth made of 28's twist and 40's weft, 56 ends and 44 picks to the inch, and the weaving wage for this was $30\frac{1}{2}$ cents per cut of 80 to 85 yards. For 39-inch cloth, 61 yards to the cut, 68 ends and 68 picks to the inch, medium counts, the weaving wage was 35 cents per cut.

In one of the weaving-rooms of the Chace Mill I saw one of the peculiar features of American mill practice—the bringing of weft to the weavers. A stalwart labourer entered the room bearing an enormous box of ring bobbins

full of weft. In a moment the weavers began to flock round him, each bringing his or her own weft-box to be replenished, and one could see them running towards him from remote corners of the room, as fowls run from every part of a poultry-yard when the henwife brings out a measure of corn. The bobbins were tumbled out of the big box and into the little boxes as fast as hands could do the work, and nobody cared how many were scattered on the floor. In a minute it was littered with them, and the last straggling chickens had to go about amongst the looms picking up the stray grains where they could find them. It was an odd spectacle.

The Chace Mill is not a new one, and when I was there I saw a good deal of very old machinery, which I believe is being gradually replaced. Side by side there were old carding engines turning out only 180 pounds of cotton a week, and new ones turning out 750 pounds. The weaving rooms were very ill ventilated; there appeared to be no fans to introduce a proper supply of fresh air, it was intensely hot, gas-jets were burning in the middle of the room, volumes of steam were spouting up like geysers from the floor, and the condensed moisture was pouring down the closed windows. The faces of the weavers looked pinched and sallow, and the arms of many of them were pitifully thin. I do not care how many dollars a week those people may have been earning: they were badly off.

CHAPTER III

A Rhode Island mill—The Northrop automatic loom—A magnificent weaving-shed—134 weavers to 2,000 looms—'Half-timers' and child labour—Work and wages—The loom-shops at Hopedale—The Queen City mill, Vermont.

MY first introduction to the famous Northrop automatic loom was at a mill which stands a short distance outside Fall River, and just within the State of Rhode Island. True, I had seen a single specimen in a textile machinist's weave-room at Dobcross, near Saddleworth; but there I had gazed at it as one may gaze at a rare tropical butterfly in the Natural History Museum at South Kensington, and had been told and shown what it could do, as one might have the habits of the butterfly explained to one by an enthusiastic entomologist. Here, for the first time, I saw these gaudily painted machines—they are all resplendent in vermilion and green—by the thousand, fulfilling the purposes of their creation. Fed by 17,300 mule-spindles and 60,000 ring-spindles, here were 2,000 Northrop looms and 743 other looms, all 32 inches wide, or more, making twills and satteens, largely from 28's to 42's twist and 36's weft, spun from 'strict good middling' cotton of 1 inch to $1\frac{1}{8}$ inch staple. The mill is driven by steam-engines of 2,000 indicated horse-power; the annual consumption of coal is about 8,000 tons, and the cost of coal was then about 13s. 6d. per ton. In comparing these with English figures, your readers should always bear in mind that in America coal is sold by the 'short' ton of 2,000 pounds.

Although the Northrop loom has not yet been acclimatized in Lancashire,¹ its principle is already so familiar as

¹ Since this was written a company has been formed for making the Northrop loom in England.

to need but a very brief description here. The essential difference between it and a common, or any other automatic, loom is, that when the weft breaks or is exhausted the shuttle is automatically recharged with weft, and threaded without being itself removed from the sley. There is a cylindrical battery or magazine, like the magazine of a revolver, over the shuttle-box at the side of the loom, and this magazine can be filled with 'cartridges'—either bobbins of ring weft or cops of mule weft. Ring weft for the Northrop loom is spun on specially made bobbins, which are simply laid into the magazines; cops have to be skewered upon a steel spindle, with a wooden head similar to that of the ring bobbin. When the weft-changing mechanism is brought into play by the action of the weft-fork, a bobbin, or a cop on its skewer, is forced from the magazine into the shuttle, which is always then at the end of the sley immediately beneath the magazine; the spent bobbin, or skewered cop, is forced out through the shuttle and the bottom of the sley, and with the first impulse of the picking-stick the shuttle threads itself and the weaving continues without interruption. All that the weaver has to do, then, in regard to the weft, is to keep the magazine charged with weft, and as there is always a contrivance on these looms which stops them when a warp thread breaks, the weaver has no need to watch the warps; when he sees a loom standing, he goes and finds the broken end and ties it up and starts the loom again—that is all. The weft magazine may contain as many as thirty charges, enough to keep the loom running for a couple of hours. The Northrop loom is the invention of an Englishman, James Northrop, formerly of Keighley; but the Draper Company, of Hopedale, Massachusetts, who bought the patents, have spent very large sums of money in perfecting the machine and adapting it to the varying exigencies of industrial use.

The weaving-shed at this mill was a wonderful sight, Here on one floor were 2,743 looms, and one's first impression on entering the room was that one was looking at a room full of looms, and nothing else. Not a strap was visible, for the looms are all driven from shafting in the basement. The straps, led through holes cut in the

wooden floor, tend to hold the looms down instead of lifting them up. The human element in the work of weaving was so insignificant as to be hardly noticeable. In the centre of the shed was a sort of raised platform or observatory, from which a bird's-eye view of the whole room could be gained, and, looking out from this point over the great wilderness of clanging machinery, one saw that it was not absolutely a solitude.

In one corner, as it were, were the 743 ordinary looms. These were mostly wide looms; all of them, as well as the Northrops, were provided with a warp stop-motion, and there were perhaps 100 weavers to the 743 looms. For the 2,000 Northrop looms, which covered the rest of the floor, there were 134 weavers—a number which I verified by counting the names in the overseer's wage-book. Some of the weavers were running twenty 40-inch Northrop looms each, others sixteen, and a number of learners had twelve each, the average for the whole of the 2,000 looms being a fraction less than fifteen. The speed of the Northrop looms was 165 picks per minute, and of the other looms 180 picks. In every case the weavers had nothing to do but to weave; weft was brought to the looms and the woven cuts were taken away by boys. In the case of the Northrop looms one cleaner (a boy) was employed for every 100 looms, whilst three oilers (men) did the oiling for the whole shed of 2,743 looms. There was one loom-fixer or tackler, at a weekly wage of \$13.90 (58s.), for every 100 Northrop looms. For the ordinary looms the tacklers were paid 55s. 6d. a week; they had charge of 136 looms each. I was told by the overseer that the production of the ordinary looms (with the warp stop-motion) was from 85 to 90 per cent. of the theoretical maximum, and that the percentage produced by the Northrop looms was not more; also that the proportion of imperfect cloth produced by the automatic looms in this mill was higher than in the case of the other looms. One of the cloths made here very largely in the 40-inch looms was 32 inches wide, and had 68 ends and 112 picks to the inch of 42's twist and 36's weft. It was woven in 62-yard cuts, and the price paid to the weavers was 27 $\frac{1}{4}$ cents per cut on the Northrop looms, and 56 cents per cut on the ordinary looms. The

latter is, I believe, 10 per cent. less than the rate paid in Lancashire, but the ordinary eight-loom weaver at this mill could earn \$9 (37s. 6d.) a week, and the weaver with twenty Northrop looms \$10.50 to \$11 (43s. 9d. to 45s. 10d.) a week.

The wages paid to the boys who clean, sweep, and carry weft to the looms are 15s. a week. These boys, from twelve to fourteen years of age, are 'half-timers,' but in the State of Rhode Island a half-timer does not work half the day in school and the other half in the mill; he works full time in the mill for four months and full time at school for the next four months, and so on. In order to convey an absolutely faithful impression of what I saw of the Northrop loom in this mill, I ought to say that a number—perhaps a dozen—of young children were going about amongst the looms helping to keep the magazines full. When I questioned the overseer about this, he told me that these children were not employed by the mill, but came in to help their parents.

'You should be here when the school is loosed,' said he, 'and you would see far more of them.'

'How many will come in then?' I asked, and was told that there might be thirty.

At the neighbouring mills in Massachusetts this would not be permitted, since no child under fourteen years of age may legally work in a mill there, whether for its parents or otherwise. The overseer told me further that the weavers often gave the cleaners a 'nickel' (5 cents) to help them in filling their Northrop magazines.

The following were some of the wage rates in other departments of this mill:—Ring-spinning (36's weft): \$1.16 per week per side of 128 spindles running at 9,400 revolutions a minute. Winding: A weekly wage of \$7½ (31s. 3d.) for minding 75 spindles. Warping: Each warper ran four mills with a drum speed of thirty-two revolutions and a take-up of 40 yards a minute, and was paid 64 cents for 24,000 yards and 450 ends. Slashing: \$11 (45s. 10d.) per man for a week of fifty-four hours. Looming or twisting satteens: 18 cents per 1,000 ends. Drawing-in satteens: 31 cents per 1,000 ends. This included the drawing of the ends through the wires of the stop-motion mechanism, and no reacher-in was employed.

These figures, and particularly the weaving prices, will, I think, show my readers who are acquainted with the Lancashire industry that the adoption of self-acting machinery has enabled the American employer to reduce his labour cost materially and at the same time to give a better wage to his workpeople.

The works at which the Northrop loom is made in America employ from 1,700 to 1,900 men, and are now mainly occupied with the manufacture of these looms and their accessories. In their general design and equipment with labour-saving machine tools these Hopedale works are a model establishment, and the village which the company has built for its workpeople is a model likewise. Eighty-five thousand Northrop looms had already been turned out when I saw the works, and although the current output was something like sixty looms a day, the capacity of the plant was about to be increased.

When the Northrop loom was first put upon the market, the makers, in order to demonstrate its merits in the most practical manner, purchased or built a spinning and weaving mill at Burlington, Vermont, and fitted it out with the new self-acting looms. This mill, known as the Queen City Cotton Company's mill, contains 55,000 spindles and 1,297 Northrop looms, and makes ordinary plain cloth of medium yarns—28's and 36's or thereabouts. For the following particulars of the work done in the mill I am indebted to Mr. G. A. Draper, of Hopedale.

The looms are of two sizes, 32-inch and 44-inch, and of the narrower looms three weavers run eighteen each, thirty-nine weavers run sixteen each, one weaver runs fifteen, four weavers run fourteen each, seven learners run eleven each, and three learners run eight each—fifty-seven weavers and learners to 850 looms, or an average of very nearly fifteen looms each. Of the wider looms seventeen weavers run sixteen each, twelve weavers run twelve each (these on striped fabrics), three learners run eight each, and one learner runs three—thirty-three weavers and learners to 447 looms, or an average of thirteen and a half looms each. The cotton used is 'good middling,' about $1\frac{1}{8}$ -inch staple, and Mr. Draper told me that a production equal to 95 per cent. of the theoretical maximum capacity of the looms had been

attained; whilst by leaving the looms running in the dinner-hour when the weavers were absent a production actually greater than the theoretical maximum had been attained.

Mr. Draper gave me also a summary of the mill's cost account for the preceding quarter. The mill and machinery cost \$900,000, and a sum of \$20,000 a quarter is written off for depreciation. During the quarter in question the mill had produced 653,814 pounds of cloth, at a cost (including interest and depreciation) of 1·9 cents per pound for weaving, and at a total labour cost 'from cotton to cloth' of 5·55 cents per pound of cloth.

One of the incidental advantages claimed for the Northrop loom is that it obviates disputes between the weavers and their employers about faulty weaving. 'The weaver cannot be found fault with,' said Mr. Draper, 'if the cloth is bad. It must be due either to bad material or to bad tackling.'

CHAPTER IV

Lowell, Massachusetts—The Merrimack River and its services—Comparative production of spindles in Massachusetts and Alabama—A drawing-in machine—Warping : a Lancashire contrast—The 'Standard List'—Six tapers to eleven machines—Automatic and semi-automatic looms—Comparative production and weaving prices—Loom-fixers and their work—Overseers—Workmen's homes and working mothers—An economic curiosity.

IF New Bedford, the Mohawk River Valley, and Long Island Sound owe their cotton mills to their climate, which is nearly as good for fine spinning as the climate of Bolton-le-Moors, Lowell, an inland town of Massachusetts, owes its cotton mills to the power of the Merrimack River. The oldest and largest of all the mills at Lowell are those of the Merrimack Manufacturing Company. Established in 1822, and rebuilt forty or fifty years ago, they comprise to-day spinning and weaving mills which contain 144,000 spindles and 4,170 looms, employing 2,200 hands, and printworks which contain twenty-two printing machines and employ 1,000 hands. The company, whose capital is \$2,750,000, has in addition a new Southern mill at Huntsville, Alabama, with 25,000 spindles and 850 looms, and I am told that the stockholders have received a steady 6 per cent. dividend for the last forty years.¹

¹ 'Most of the capital employed in the Southern cotton mills comes from the North. Alabama formerly had a law limiting the hours of labour for children in factories to eight per day ; in 1894 certain Massachusetts capitalists induced the Legislature to repeal this restrictive statute, promising to establish mills in the State if they could insure a supply of "cheap labour." I am informed that

The mills at Lowell—brick buildings six stories high—are driven partly by water and partly by steam. The water-power is obtained from a canal which is led out of the river above the mills and rejoins it below them, and this canal, shaded on both sides with old trees, and flowing swift and clear down the middle of the street leading to the mills, is an ornament as well as a profitable servant to the town.

Pure water, thanks to the great river, is abundant at Lowell, and is used in a very ingenious and effectual way for refreshing the dusty streets. Along the electric tramway runs a watering-car with motors and a trolley-arm just like those of an ordinary tramcar. On either side of the car is a long perforated pipe, which by the turning of a handle can be swung out at right angles with the car so as to reach almost to the footpath or folded back alongside the body of the car. In this way one car running at a good speed with both wings outspread waters the whole width of the street from kerb to kerb, and when it meets another vehicle simply folds whichever wing may be necessary to let the other go by. I have seen this nowhere else in America, but it is a device which seems particularly well suited for English towns where the tramways are worked by the local authority.

But to return to the Merrimack mills. The finest yarns spun there are 95's, made from 'Peeler' cotton, an American growth distinct from Sea Island, and said to be stronger and harsher than Egyptian cotton. Most of the yarns are, however, medium numbers, spun from Texas and Arkansas cotton of $1\frac{1}{8}$ inch staple, and not more than 852 ring-spindles are run by any one girl. Spinning the same yarn (28's twist), the frames at the Lowell mill produce 1.35 pounds per spindle per week of fifty-eight hours, and the frames at the Alabama mill 1.42 pounds per spindle per week of

of the mills in Alabama City not a single share is held in the South. The labour laws of Massachusetts are among the most advanced in the world; no child may go to work under fourteen, and then only after having attended school for at least a year; consequently 98 per cent. of the children of school age are on the roll. People in the South very naturally resent the exploitation of their rising generation for the benefit of those who protect their own children from a like evil.' (From an article on 'Child Labour in the Southern States' which appeared in the *Manchester Guardian* of May 8, 1902).

sixty-seven and a quarter hours, figures which go to show that in this case the superior efficiency of Northern labour is more than counterbalanced by the longer hours at present worked in the South.

An interesting example of labour-saving in embryo—and the saving of labour the cost of which is already very trifling—was shown to me at the Merrimack mills, in the shape of an automatic machine for drawing-in the warp threads through the loom harness. The machine was made at Boston, and was said to be capable of drawing-in 240 ends a minute, or more than eight times as many as are being drawn-in by hand at Fall River. When I saw it, however, it was not doing anything approaching this, because it had to be stopped every few seconds while the operator adjusted the healds for it. Another drawback was that the healds had all to be threaded beforehand on a spiral steel spring, and I was told that to do this cost almost as much as the whole operation of drawing-in by hand. These difficulties, however, the inventor hoped to overcome before long, and inasmuch as drawing-in is an occupation peculiarly bad for the eyesight, his success would be welcome.

Another interesting feature of the Merrimack mills was that there were thirty-five warping mills and only seven warpers. This contrasts sharply with the practice of a Lancashire mill which I had visited not long before, where the manager had tried the bold experiment of giving two warpers three mills between them instead of one each, and had abandoned it because, although the warpers earned better wages, they did not get the full production out of the machines. When I explained this to an American manager, he could not at first believe that the Englishman was not making a foolish mistake.

'Why,' he said, 'don't they buy another frame, or two more, or as many as may be necessary to make up for the diminished output? The cost of a frame is only so much'—he named a figure—'and they would save as much in labour'—here he made a rapid calculation—'as would pay for the additional machinery in a very short time. And the warpers might still receive much higher wages.'

I reminded him that the price of labour in Lancashire cotton mills was regulated by a standard list which did not

provide for variations in the piece rate according to the number of the machines run by the operative.

'Ah,' said he, 'that accounts for it. Well, the sooner your employers and workpeople modify that list so that the employers may have some inducement to adopt machinery and methods which will diminish their cost of production, and at the same time enable the "help" to carry home more money at the end of the week, the better for them, and,' he added, with a somewhat rueful candour, 'the worse for us.'

At the Merrimack mills five women warpers run six warping mills each, one runs three mills, and one two; the last on warps for fancy goods. They each earn 33s. 4d. a week (as compared with, say, 21s. in Lancashire), and of course the mills run appreciably slower than ours.

There are eleven slashing machines made by a Lancashire firm, and run by six slasher tenters. Five men were running two machines each at a weekly wage of 55s.; the other machine was in charge of a man who was receiving 43s. 9d. Each tenter had an assistant, whose wages were from 29s. to 33s. 6d. a week. This arrangement is not general at Lowell or elsewhere in New England; indeed, at every other mill which I had seen there was a tenter to each machine.

In one of the weaving-rooms I found 100 Northrop looms, all run by men, each of whom, I was told, could earn about 42s. a week with twenty looms. In the same room were a large number of ordinary looms weaving similar goods—print-cloth and shirtings—but run by women. The ordinary looms, as well as the Northrops, had a mechanical warp stop-motion—a row of metallic healds or wires suspended on the warp threads behind the ordinary healds. One wire was hung on every two threads of the warp, and was so arranged that in case either thread broke the wire failed to rise with the lifting of the harness and came into contact with a horizontal bar connected with the weft-fork, causing the loom to 'knock off.' Some of the women weavers were running six of these looms, some eight, and some ten, and many of the weavers appeared to be considerably over fifty years of age. The ordinary looms were running at 190 and the Northrop looms at about 180 picks a minute.

On the wall of the room was a notice, in compliance with the Massachusetts Factory Act, giving particulars of the prices paid for weaving, and from it I obtained the following figures: For a print-cloth 28 inches wide, in cuts $53\frac{1}{2}$ yards long, 64 ends and 60 picks to the inch, 28's warp and 36's weft, the weaving prices per cut are—

- (a) If woven on ordinary looms with 6-inch bobbins or with 5-inch cops, 22 cents.
- (b) If woven on ordinary looms with 7-inch bobbins, 21 cents.
- (c) If woven on Northrop looms, 11 cents.

I was told that as a rule the Northrop weaving price at this mill was one-half the price for weaving done on ordinary looms plus 10 per cent. The notice stated that the prices quoted above were for perfect weaving, and that for imperfect work 50 per cent. less would be paid. The average weekly production per loom of ordinary print-cloth 28 inches wide was from 270 to 280 yards per week (fifty-eight hours) for the ordinary looms and 245 yards a week for the Northrops. On account of the greater tension of the warp, the Northrop loom, I am told, weaves a somewhat greater length of cloth than the common loom from the same length of warp—about 4 per cent. more.

The number of loom-fixers or tacklers employed here, as at other New England mills, was surprisingly small. Seven hundred and fifty of the ordinary plain looms with warp stop-motions were under the care of five tacklers, and other tacklers had 125 looms each; these men were paid 46s. 3d. a week. Eighty Northrop looms were in charge of one tackler at 46s. 3d. a week, assisted by one oiler-and-cleaner at 30s. a week; and the tacklers in charge of looms weaving lenos (two, three, and four beams each) earned 51s. a week and ran 60 looms each. On the day after I visited the mills all the tacklers came out on strike; it was a case of *post hoc sed non propter hoc*, for their intention was known to the superintendent before my arrival at Lowell. Their grievance, I believe, was unconnected with their wages or the number of looms entrusted to them; it arose out of the employment as tacklers of men who were not members of the Lowell Loom-fixers' Club, a very strong society, whose entrance fee is, I am told, \$25. A large proportion, perhaps

one-third, of the Merrimack loom-fixers had been in the service of the company for ten years or more, and some of them for from twenty to twenty-five years.

I could never understand how one tackler could attend to so many looms until I saw one of the Merrimack tacklers change the beams of a loom and 'gait' it up. Before the old warp had run out the new warp was brought in from the sizing-room on a trolley which carried four beams held vertically. As soon as the last cut was finished the tackler and a woman specially employed for such work took the loom over from the weaver. The woman helped the tackler to 'gait' each beam, and in fifteen minutes the whole job was done and the loom running again. The weaver had nothing to do with the new warp until the loom had been started and was working smoothly.

Nor had the weaver to take the woven cloth out of the loom. The whole roll was lifted out (not pulled off) and examined by a 'room-girl' in the room in which it was woven. If any serious faults were discovered in the piece, the room-girl would report them to the overseer, and the weaver would be 'called up' before the whole room. This 'calling-up' is felt by the weavers to be something of a disgrace, and the superintendent assured me that its disciplinary effect was even greater than that of the fines.

Good overseers at Lowell command good wages—from \$4 to \$6 a day—but their work has been much increased during the past fifteen years. At the Merrimack mills, for instance, there were formerly six overseers in the weaving department, four in the spinning department, and four in the carding department. To-day there are but two in each department, or six in all, as compared with fourteen. The pay of an overseer was formerly \$3½ a day, so the work has been increased in a greater proportion than the reward. 'Speeding-up' has been the rule all round; the looms that ran at 170 picks fifteen years ago are now running at 190, and everything else has been quickened to keep pace with them.

The Merrimack workpeople are paid every Friday morning for work done up to the preceding Friday morning, so that a week's wages are always in the hands of the company. A number of them live in houses belong-

ing to the mill, but the company has already sold many such houses, and is not building any more. Some of the employes have saved enough to become their own landlords. The average rent of a workman's dwelling, containing four rooms and a small kitchen, is 10s. 6d. a week. The houses are probably no better than can be obtained at Oldham or Bolton for half the amount; but their physical environment is far more pleasant, and the really magnificent public library and excellent technical school afford the people opportunities for improvement such as are within the reach of few in England.

The healthy American sentiment against the wife's working in the mill when there are young children in the family has not, I fear, very much force with the foreign weavers and other factory hands at Lowell. In the doorway of the mill I saw a placard advertising a day nursery where, at the rate of 10 cents for one, or 15 cents for two, children are taken care of during the day-time. Outside a theatre or public hall were bills announcing a performance to be given for the benefit of the same institution, which, I am told, is partly supported by gifts, or perhaps one should say by subsidies, from the mill-owners and shop-keepers of the town.

Before leaving Lowell let me record an incident which seems to me a curious reversal of a familiar economic precedent. I was told that one of the mills at Lowell bought recently 1,000 new automatic looms, and the loom-makers took in part payment the thousand non-automatic looms which were displaced by the change. Many of these non-automatic looms had been running for only three or four years, and were therefore in their very prime—perhaps better than when new. Their value may easily have been £6,000. But the automatic loom-makers who had bought them (by exchange) broke them up carefully into small fragments before they removed them from the mill, in order that they might never be in the market in competition with their own automatic loom. The association of machine-smashing with the introduction of labour-saving appliances is nothing new; but whereas formerly labour smashed the new machines to protect the old, now capital smashes the old machines to protect the new.

CHAPTER V

Manchester, New Hampshire—A 'garden city'—Gigantic mills—
Water-power and coal—Freight rates to Boston and New
York—Wages at Manchester—'Unions' and 'ginghams'—
—A mill boarding-house—Middle-class comfort and cheap
food—Lake Massabesic.

NONE of the manufacturing towns of New England pleased me so much as Manchester, in New Hampshire. Unlike its great godmother, it has clear air, clear waters, and sunny skies; almost every street is an avenue of noble trees, whose leaves fall so thick in autumn on the electric car tracks that at first, when they are sappy, they make the car wheels skid, and later, when they are dry, they are fired by the sparking current, and fill the city with aromatic smoke. And, as if all these green trees were nothing, the citizens have given themselves public parks or gardens upon a scale of unexampled generosity. The city is laid out in rectangular blocks, which, since it is hilly, do not rob it of variety; and, if you walk diagonally across the town, starting at the right point and going in the right direction, every third 'block' or square of the chessboard to which you come will be a public pleasure-ground.

Perhaps the handsomest, certainly the most impressive, buildings in Manchester are the Amoskeag and the Manchester Mills. They are not ornate—ornate mills are often hideous—but they are built of a warm red brick, beautifully weathered, and form a continuous curved façade (like the concave side of Regent Street in London), nearly half a mile long. Rising sheer out of a deep, clear, swift-flowing stream (the Merrimack), upon the other bank of

which are grass and trees, they need little more than to be silent to masquerade successfully as ancient colleges.

Not until one has passed over one of the pretty bridges and penetrated through the waterside building to the court beyond does one begin to appreciate the enormous extent of these simple, stately buildings. Behind the riverside pile there runs a courtyard so long as to be more like a private road, and on the other side of this road stands another line of mills, parallel with the curve of the first, so that one cannot see to the end of them. First come the Manchester Printworks, new buildings containing 17 acres of floor space, and seventeen calico-printing machines; then the Manchester Mills, where there are 3,250 looms, with a proportionate number of spindles; and, finally, the Amoskeag Company's mills, eleven of them, containing 11,000 looms, and between three and four hundred thousand spindles. The eleventh mill was built in 1893.

The Manchester Mills and Printworks draw 3,000 horse-power, and the Amoskeag Mills 8,000 horse-power, from the river. Sometimes the mills are stopped for a day or two in winter, when the river rises so high as to cause back-pressure on the turbines, but there is never any stoppage on account of drought. The water-power is supplemented by steam; the coal comes by boat from Portsmouth, thirty miles away, and costs from 15s. 6d. to 16s. 8d. per ton at the mills. The manufactured goods are sent from Manchester to Boston, a distance of fifty or sixty miles, by rail, at a station-to-station rate of 8 cents per 100 pounds, or to New York (partly by sea), a distance of 350 miles, for 9 cents per 100 pounds.

The Manchester Mills manufacture woollens, cottons, and unions, and print on their own account both plain and fancy goods, some of which are bought from other mills. I found that in the cotton department labour on the roving frames was paid for by the hank, and that the rovers earned from 25s. to 29s. per week, as compared with 48s. at Fall River. Cotton spinners on ring frames were paid 24s. per week for minding six sides—a low wage as compared with New Bedford; but there the spinners mind many more spindles. The doffers here earned nearly as much as the spinners, viz., 21s. 3d. per week; and the cotton slasher-tenters, who were

mostly French Canadians, were paid from 35s. to 43s. 9d. per week. Eight single-beam slashers and one double-beam slasher did all the work for 2,075 looms weaving with cotton warp and woollen weft and for 1,175 worsted looms.

One thousand of the looms at the Manchester Mills are jacquard looms, and none of the looms have drop-boxes. The pay here for weaving print-cloth (the same description as that for which $22\frac{1}{2}$ cents a cut was paid at Fall River and 21 cents to 22 cents at Lowell) was 25 cents per cut, but the weavers did not run quite so many looms. The worsted weavers could earn about \$9 a week on two, three, or four looms, varying in width from 30 inches to 54 inches; only five or six worsted weavers ran six looms each. There is a large output of a low-class union cloth for women's wear, made with cotton warp, and having from 40 to 44 picks of fine worsted weft per inch. It is, I believe, sold wholesale at from 4d. to 5d. a yard.¹

The Amoskeag Mills are employed exclusively in the manufacture of ginghams, by which is understood in America any sort of coloured cotton goods. Large quantities of mule yarn are spun here from cotton dyed in the bale. On the ring frames a large bobbin measuring about 8 inches by 2 inches is used for spinning bleached and doubled yarn. One remarkable feature of the Amoskeag Mills was the imposing array of ball-warping machines, constructed to the superintendent's own design. The warp is taken from bobbins in an ordinary V-creel and brought through a reed in front of the machine, which stops automatically when an end breaks. The ends are then gathered up, carried in rope form through a porcelain eyelet on the floor, thence through another above the machine, and finally brought down to a revolving iron rod driven by bevel wheels

¹ The following particulars of the wages paid at the Manchester Mills in July, 1896, were communicated by Mr. Henri Schaeffer to M. Levasseur: During the month 2,770 employes received \$70,455, an average of about \$25 $\frac{1}{4}$ for men, women, and children. The working day was ten hours long, and the average time made in July twenty-three days. In the carding department men made \$1 a day; in the spinning department the spinners made \$1.35, and the helpers 80 cents; labourers made \$1.15, and overseers \$3.49 ('The American Labourer,' p. 313).

at right angles to the machine. This part of the machinery is placed behind the warping mill and on one side, close to the V-creel, so that the warper is not compelled to leave the bobbins when an end breaks. By this means one warper is enabled to run six mills with no assistance except for creeling. These machines are used chiefly for grey warps. The looms upon which the coloured goods were being woven were ordinary looms and looms with drop-boxes. The weavers were running six of the drop-box looms each, and were earning from \$6 to \$10 (25s. to 41s. 10d.) a week. The loom-fixers looked after sixty looms each, and were paid 50s. a week.

The mill hands at Manchester, as at Fall River, New Bedford and Lowell, are largely immigrants. Out of a total population of 65,000, Manchester has 22,000 French Canadians and more than 15,000 Germans, the latter attracted, no doubt, by the printworks. I was curious to see how the mill population lived, especially in the boarding-houses owned by the mills, for they were certainly less well paid than the operatives of Massachusetts, and if the general English belief as to the relative purchasing power of the dollar and the shilling were well founded, they must, I thought, be rather badly off. In this I was agreeably disappointed, and I confess that my prejudice against mill boarding-houses was likewise considerably modified by what I learned at Manchester.

First let the reader visit a boarding-house for mill girls which stands close to one of the mills and belongs to the mill company. It is an old block three or four stories high, and Mrs. Smith, the lady who receives us, is the lessee and manager. Her mother, who preceded her in the business, conducted it for twenty-five years, so Mrs. Smith has a good deal of inherited experience. She has probably inherited also something more tangible if her mother was as successful as another boarding-house-keeper, of whom I was told by a lawyer in the town that she left between \$15,000 and \$20,000. Mrs. Smith occupies the house, she tells us, at a nominal rental—probably not more than one-fifth of its value—runs it as a commercial enterprise, and, as she says, ‘makes it pay.’ There are many similar boarding-houses round about the mills, and the only qualification re-

quired by the mill-owners of their tenants is a certificate of good character.

The ground-floor of this house contains at one end a parlour cosily furnished with carpets, curtains, armchairs, lounges, a piano, pictures, and bric-à-brac. The girls are now all at work, but in the evenings they use it as a reading and sewing room. Next to the parlour is Mrs. Smith's office and private room, and at the opposite end of the building is a dining-room capable of seating eighty-five persons. Two classes of workpeople are allowed to use this room—first, women living in the house, who pay from 8s. 4d. to 9s. 4d. a week, and have private bedrooms, the use of bath-rooms and sitting-rooms, and three meals a day; and, secondly, other employés, men or women, who board only, and pay 9s. 4d. (men) and 8s. 4d. (women) a week. Mrs. Smith says that she has eighty girls living in the house, and could let many more rooms if she had them; she serves meals to 150 people three times a day, and, as there is not room for all at once, every meal is served twice.

The bedrooms have every appearance of middle-class comfort and refinement. They are prettily carpeted; each one has its own radiator to warm it in winter. The bedsteads are brass-lacquered, with white coverings. The furniture—a dressing-table, chairs, and a writing-table—is of American oak, and most of the rooms have been decorated with some taste by their occupants with pictures, photographs, and knick-knacks. Only a wardrobe is missing, but you will find its substitute in the form of a substantial American trunk in the corridor outside the bedroom door.

The mill company stipulates that the fare provided in its boarding-houses shall be sufficient in quantity and in quality varied and good. The following bill of fare provided at this house does not strike one as erring on the side of parsimony:

Breakfast, from 5.30 to 6.30, always consists of porridge and milk, two kinds of hot meat, baked potatoes, hot rolls and butter, tea or coffee, and condiments.

Dinner, from 11.30 to 12.30: Soup; three kinds of hot meat; potatoes, tomatoes, corn on the cob, or other vegetables; pastry, and tea or coffee. Eight bushels of vegetables are usually needed for one meal, and the housekeeper

says that to-day fifty-three tins of marrowfat peas were used at dinner.

Supper : Tea or coffee, bread-and-butter, cold meats, jam and jellies, and an iced sweet-cake something like a jam sandwich. Sometimes hot dishes are substituted for the cold meat. To-night, for instance, there is to be 'clam chowder,' a delicacy in high favour with Americans of all classes.

The girls are at liberty to spend their evenings where and how they please, provided they are in by ten o'clock. If they are out later than ten a satisfactory explanation is required. They arrange for their own washing, which they may do in the house (where facilities are provided) or they may send the clothes out.

Seventeen servants are employed to do the housework, and the kitchens, cold store, and ice-room are well appointed and clean. Sixty tons of coal, says Mrs. Smith, were used in the large boiler in the basement for heating the coils last winter. I think you will agree that fivepence or even fivepence-halfpenny each for meals such as I have described is not an exorbitant charge, especially when it includes lodging also, and that in this new Manchester by the Merrimack a dollar goes quite as far in food and lodging as 4s. 2d. in Manchester by the Irwell.

It may be urged, however, that the fare in these boarding-houses is partly a gift from the mill-owners in lieu of wages ; and, in so far as the rents paid for the houses are less than their value, that is in a sense true. Come with me, then, into a restaurant on one of the main streets of the town—a place where lawyers and other well-to-do citizens take their evening meal—and see what you can get for 'a quarter,' or, in English, a shilling and a halfpenny. The place is well appointed and clean, and this is an exact copy of the bill of fare for dinner and supper on May 2, 1902 :

DINNER : 25 cents.

SOUP.

Clam chowder.

FISH.

Boiled halibut and egg sauce.

ROASTS.

Stuffed lamb, loin of pork,
Sirloin of beef.

ENTRÉE.

Fried hornpont.¹

VEGETABLES.

Potatoes, green corn, creamed
macaroni.

DESSERT.

Apple, mince, and pumpkin pies, rice pudding.
Tea, coffee, milk.

SUPPER: 25 cents.

COLD.

Roast lamb, roast beef, roast pork, corned beef.

HOT.

Clam chowder, fried hornpont, fish hash, macaroni
and cheese, baked potatoes.

MISCELLANEOUS.

Hot biscuits, strawberries and cake, toast, plain bread,
rolls, Graham bread, assorted cakes, sauce.
Tea, coffee, milk.

Understand that you may have as much as you please of everything for your 'quarter.' But the bill of fare bears two intimations which would be laughable if they were not rather pathetic, as significant of an abused liberality. 'Anything served outside this bill of fare is charged extra,' and 'One meal served to two persons is charged extra.' Finally, let me point out that anybody who thinks 25 cents too much to pay for these meals can buy for \$3 $\frac{1}{4}$ a book of tickets entitling him to twenty meals; this 'figures out,' as an American would say, at 8 $\frac{1}{2}$ d. 'a time.'

But enough of the fleshpots of New Hampshire. Within a 5-cent street-car fare of the town lies Lake Massabesic, a great sheet of clear blue water, fresh and unsullied as when the red man gave it its uncouth name—a lake that would be a boasted ornament even of Cumberland. Here the mill people of Manchester come and play in the summer evenings amongst the woods and in boats upon the water. And if

¹ Hornpont is a kind of fish.

they want to go further afield, say on a Sunday or the Fourth of July, a few miles' paddling up the Merrimack in a canoe, with one or two easy portages, will bring them into the wild woods where the deer come down to drink at the riverside.

Is it wonderful that the people of Manchester seem happy and healthy above their fellows?

CHAPTER VI

Maine—Successful competition with Lancashire—Magnificent waterfall—Smokeless soft coal: consumption and cost—Systematic 'time-cribbing'—Mule-spindles and rings—Piece rates and earnings—Sheetings, drills, and jeans—Percentage of imperfect cloth—Best climate for weaving drills—Mill boarding-houses and cottages—Migratory labour—Brunswick and Lisbon—Cheap power—The 'Harriman' automatic loom—Warp stop-motions and the quality of warps—An experiment that failed—A singular community.

IT was in a town which I may not particularize, further than to say that it is not a hundred miles from Portland, Maine, that I first found an American cotton mill engaged mainly in the manufacture of goods for foreign markets, and therefore competing on equal or fairly equal terms with the mills of Lancashire. There are, in fact, not one mill, but two, formerly independent, but combined some years ago under common ownership and management. The combined capital is more than \$2,500,000, and the combined plant consists of 322,000 spindles and 7,800 looms. My visit, however, was paid only to the larger of the two mills, and my description will be of it alone. In this mill there are 221,000 spindles, of which 190,000 are on ring frames and the remainder, 31,000 mule-spindles, are now being exchanged for rings. The total number of looms is 6,500; 4,800 of them are from 36 inches to 40 inches wide, and the remaining 1,700 weave sheetings 72 inches wide and upwards. The mill makes drills, sheetings, and jeans of first-rate quality, which are shipped to China under a trade-mark well known to everyone interested in the China trade.

Motive-power for the mill is obtained mainly from a magnificent waterfall beside which it stands. Forty turbines, developing collectively 6,000 indicated horse-power, drive the mill shafting by ropes, whilst to supplement and steady their work there are two pairs of high-speed high-pressure compound steam-engines of 1,400 and 1,300 horse-power respectively (also driving by ropes), and an auxiliary Corliss engine of 700 horse-power, which is not used except on rare occasions when the water-power fails. The engines, steam-pipes, and pumps are under the charge of a chief engineer, at a salary of £270 a year; a 'master mechanic' has charge of the turbines, shafting, and machinery; and a 'master carpenter' looks after all the woodwork. In running the two pairs of main engines, coal is consumed at the rate of 3 tons per horse-power per annum, or 2.18 pounds per hour. The coal costs at present about 17s. 8d. per ton; it is a bituminous slack from Virginia, and made, I was told, a great deal of black smoke until a higher chimney was built. Now it makes no smoke at all, and as I had often noticed soft coal being burned in Massachusetts without mechanical stokers on the furnaces and without making black smoke, I was curious to know how it was done. The explanation given to me here was that this soft American coal gives off its combustible gases at a much higher temperature than our Lancashire and Yorkshire coal, and that therefore they are burned as soon as liberated, and the smoke with them. Only two men were employed here for firing sixteen boilers. In view of the cost and quality of the coal, the mill would, however, be badly off were it not for the water-power.

The mill has been built for over fifty years, and has been making the same kinds of cloth all the time. During the past fourteen years the company has never paid less than 12 per cent., and generally has paid 14 per cent.; the 12 per cent. dividends followed the absorption of the other mill, which had been paying only 8 per cent. In addition to these high dividends, the mill has returned to its shareholders bonuses of 50, 40, 25, and 10 per cent.—that is to say, 125 per cent. in bonuses alone.

The hours worked are nominally sixty per week. The regular hours are from 6.45 to 12 and from 1 to 6 o'clock, except on Saturday, when work stops at 4.30. In point

of fact, however, the engine always starts ten minutes before the appointed time; a bell rings when it starts, and as soon as it gets up speed work begins. The superintendent admitted quite frankly that he 'cribbed time' to the extent of ten minutes a day; but as I saw the mill girls returning to their work some time before the engine started, and as I know that it does not take a mill-engine anything like five minutes to get into its stride, I think that ten minutes is an understatement.

About 58,000 bales of 'middling' and 'good middling' cotton of $\frac{7}{8}$ inch to $1\frac{1}{8}$ inches staple are used annually by the two mills, and it is bought, as a rule, at the beginning of the season, when there is the best selection. The counts spun range from 5's weft (for flannelettes) to 29's twist and 36's weft (for satteens). The average counts are a shade finer than 19's.

The preparation machinery in the spinning department is such as one sees in every up-to-date mill in Lancashire. In one room on the ground-floor I noticed nine automatic 'feeder-and-preparer' machines (in another room there were sixteen) run by one man at a wage of 5s. a day. These machines were connected by suction pipes with nine triple sets of scutchers on the first-floor; the cotton passed through three scutchers before reaching the cards. On the second-floor were 700 of Platt's patent carding engines (about half of them built in America), each carding between 700 and 800 pounds of cotton a week. Of the slubbing, intermediate, and roving frames, many bore the name of a Rochdale maker.

The overseer of the spinning department told me that more than 60,000 mule spindles had already been thrown out of this mill, partly because the mule spinners were 'always going to strike.' 'The principal reason,' he added frankly, 'was that we found we could spin one-third cheaper on the ring frames.' I asked what became of the poor mule-spinners when their machines were discarded, and he said that most of them became weavers. The mules here have 1,564 spindles to the pair, and on 25's weft $\frac{1}{3}$ d. a pound is paid to the minder. In addition, a back-boy is paid 2s. 3d. a day, but there is no piecer. With one pair of mules a minder made recently \$25.45 (say £5 6s.) in

eleven days—that is, in two weeks less one day.¹ The spindles of the ring frames run at 10,780 revolutions, and the spinners mind twelve sides of seventy-two spindles for 9 cents per side per day. They keep the rollers clean, but have nothing else to do in the way of cleaning or sweeping.

The floors of this mill were kept beautifully clean by an army of small boys, who are continually sweeping and scrubbing. These youngsters are paid 2s. a day, and, as far as I could judge, most of them were from twelve to fourteen years of age. Upon this point, however, it was rather difficult to get exact information. One boy whom I questioned told me that he was thirteen.

‘How long have you been in the mill?’ I asked.

‘Don’t know.’

‘Have you been here a year?’ said I.

‘Yep,’ was the prompt response, and I felt that it was hopeless to pursue the investigation further.

The winders are paid 16 cents for winding fifty spools of from 14’s to 22’s twist. Each spool carries $1\frac{1}{4}$ pounds of yarn, so that $62\frac{1}{2}$ pounds are wound for 8d. They mind fifty spindles each, and can earn as much as 25s. a week—a better wage than is earned by winders in Lancashire, although the Lancashire rate of pay per pound is considerably higher. The warpers run two mills each without a creeler, and can earn excellent wages, about 39s. 6d. a week. The drum speed of the mills is fifty-two revolutions a minute, and the pay for 350 to 400 ends, five wraps (17,500 yards) to the beam, is 1s. 6d. per beam. The slasher-tenters are paid from 45s. to 48s. 4d. a week, and for every five machines there are two labourers, at about 30s. a week each, to help in doffing and give other assistance.

‘One secret of the excellence of our drills,’ said the superintendent, ‘is that we use just enough size to weave them and no more.’ The warps for the drills are sized with corn starch (that is, maize starch) and flour, those for jeans with corn starch only. The drawing-in here, as usual, is done by girls, who are paid about 1 cent per 100 ends, and earn from 25s. to 26s. 6d. a week. Twenty-three cents are

¹ M. Lavasseur found that in the Howland Mill, New Bedford, one mule-spinner made as much as \$19, or £3 19s. 2d., a week.

paid for a beam of 2,368 ends, two harness, and 36 cents for a beam of 3,600 ends, three harness. This piece rate is again lower than the rate for similar work in Lancashire.

The principal sorts of cloth woven are 64-square sheetings, 70 by 48 drills, and 96 by 64 jeans. All the cloth is sent out in the 'grey'—or, as Americans say, the 'brown'—state. Here are the weaving prices and particulars of these cloths:

Plain sheetings: 64 ends and 64 picks per inch, 22's warp and 25's weft:

36 inches wide and 50 yards long, 31 cents per cut.

86 inches wide and 43 yards long, 74 cents per cut.

96 inches wide and 43 yards long, 77 cents per cut.

Drills: 70 ends and 48 picks per inch, 13½'s warp and weft, 29 inches wide and 40 yards long, 17½ cents per cut.

Jeans: 96 ends and 64 picks per inch, 22's warp and 25's weft, 30 inches wide and 30 yards long, 20 cents per cut.

Two thousand two hundred looms are constantly employed in weaving the drills, and 700 in weaving the jeans, all for the China market, and at the time of my visit there were no automatic looms or warp stop-motion attachments in the mill. An order had, however, been given for ninety Northrop looms, which were to be put by themselves in one room. Immediately beneath this room is another of the same size containing ninety ordinary looms. The Northrop looms were to be of the same width as these, and were to be given exactly the same work (viz., 64-square sheeting, 48 inches wide, made with 22's warp and 25's weft), it being the superintendent's purpose to make a strictly competitive test of their merit for his work.

The women weavers in this mill were running four or six looms each, and a few very good weavers had eight apiece. The earnings of a four-loom weaver were 23s. 4d. a week, of a six-loom weaver 35s. 3d., and of an eight-loom weaver 46s. 8d. The same rate per cut is paid to an eight-loom weaver as to a four-loom weaver, and the same output of cloth per loom is required.

In the weaving of drills perfect work is demanded; the weaver has to find and meet the pick, and heavy fines, up to 50 per cent. of the pay for the piece, are inflicted if the

work is faulty. For one mispick in a piece of drill a quarter of the pay for that piece might be docked. About 7 per cent. of the total output, I found, was graded as 'imperfect,' or 'seconds'; but this, said the superintendent, was of no great consequence to him, since he could sell the seconds in the home market for as much as the perfect cloth realized when sold for export. The fines, he said, were necessary as 'a matter of discipline.' Sometimes, he told me, as many as 1,300 pieces were rejected in one week out of a total production of 18,600 pieces.

The men weavers had six wide sheeting looms each, and could earn 47s. per week. The looms (which had no brakes) were running at about 115 picks a minute, and the air in this room was extremely hot and moist. Oiling, cloth-carrying, and weft-fetching are done by extra hands, but every weaver is required to clean his own looms twice a week, and the looms are clean indeed. I was told that the speed of the 67-inch looms was 120 picks, and that of the 86-inch and 96-inch looms not more than 110 picks a minute.

The tacklers at this mill have 120 narrow looms or 60 broad looms each, and earn from 45s. 6d. to 50s. a week. In the warehouse I saw fifteen girls examining the cloth for faults. Each girl examines the product of 230 looms, and is paid 23s. per week. Here, again, there is some saving as compared with the cost of cloth-making in Lancashire. The finished cloth was being packed under pressure in bales bound with rope. Iron or steel hoops are seldom used in an American warehouse. Before I left the superintendent took me down to a great cellar and showed me an asphalt floor covered with hundreds of thousands of bobbins of ring weft and many large boxes filled with cops, all of which were to be kept there for two or three weeks. There were a few small jets of artificial moisture. He explained that by conditioning the yarn in this way he was able to use a hard-twisted weft without fear of its kinking. Lancashire has a short-cut to the same end, but I wonder whether the end reached is quite the same after all.

One explanation that was given to me in America of the excellence—my friend said the 'superiority'—of American drills was that a dry climate is better for weaving drills than

a damp one. He said that some time ago a firm at Todmorden in Lancashire tried to weave American China drills with the same yarns and machinery as are used in America, but failed. They could not get a sufficiently 'full' cloth, and they admitted it. My friend said that the cause of the failure was undoubtedly the climate. How this may be I do not know, but I have not found drills being woven in those parts of New England where the climate most nearly resembles that of Lancashire.

In the neighbourhood of the mill which I have been describing there are a number of boarding-houses, built by the company fifty years ago for the accommodation of their workpeople. The weekly rate for boarders was then 6s. 3d. a week; now it is from 8s. 4d. to 10s. 5d. a week for girls, and from 12s. 6d. to 14s. 7d. a week for men, according to the wages earned. These boarding-houses are let, as at Manchester in New Hampshire, to managers, who, with one or two exceptions, may take no boarders other than the employés of the mill. The company owns also 100 houses, which are let at from 16s. 8d. to 41s. 8d. a month. The houses at 16s. 8d. have but four rooms each, and are by no means attractive-looking. I am told, however, that out in the country, but within easy reach of the mills, the workpeople can rent nice six-roomed cottages for from 20s. 10d. to 25s. a month. Wages are paid every fortnight, and the mill always keeps about a week's wages in hand. The wages account is made up on Saturday night, and the wages are paid on the following Thursday, Friday, or Saturday. About 5 per cent., on an average, of the 1,800 hands on the pay-roll leave every week, and their wages are, of course, then paid up in full.

An opportunity of visiting the Cabot Manufacturing Company's mill at Brunswick and the Farwell Mill at Lisbon (Maine) was particularly welcome, because I had been told that I should see there an automatic loom which might one day rival the Northrop loom in the esteem of manufacturers. The Cabot mill contains 70,000 spindles (many of them mule-spindles) and 1,600 looms, and makes plain sheetings and satteens. It stands beside the Androscoggin River at a point where the stream makes two bold leaps down steps in its course, roaring so loudly that just

outside the mill the noise of its machinery is quite drowned by the falling and surging waters. From these falls the mill derives, by means of turbines, over 3,000 indicated horse-power, of which it keeps 2,400 horse-power for turning its own machinery, and sells the rest at something over £4 per horse-power per annum, to an electric tramway that runs between Brunswick and Lisbon. The revenue thus earned is £3,000, and the manager told me that this gave the mill its driving-power for nothing and a little profit besides. There is not a steam-engine in the mill, for these modern turbines, running at a speed of 1,000 revolutions, can be governed almost as perfectly as a steam-engine, and a variation of forty revolutions when the speed is so high makes no appreciable difference in their work.

The wages paid in this remote corner of New England approximate more nearly to the Lancashire standard than those of some of the more populous districts. The winders wind, on the average, 1,472 spools of 28's twist a week; each spool carries $1\frac{1}{4}$ pounds of yarn, and the winder's weekly earnings are about 24s. The warpers run four mills each, and earn about 29s. a week. The manager, however, told me that he was thinking of giving each warper six mills and of running them more slowly. The standard cloth woven here is a sheeting 39 inches wide, 54 yards long, 72 ends, and 80 picks to the inch (on the table), made of 28's warp and 37's weft; and the weaving price is 40 cents per cut, which, if I am not mistaken, is exactly the list price for weaving a similar cloth in Lancashire. This is the price for weaving it on ordinary looms, of which the weavers run four, six, or eight, according to their ability, and a production of three cuts (162 yards) per loom per week is expected. The working week is sixty hours, but the looms were running no faster than 160 picks a minute. A better production was being obtained from ordinary looms fitted with a mechanical warp stop-motion, and a still better production from the Harriman automatic loom.

The Harriman looms resemble the Crossley and other English automatic looms more closely than the Northrop loom. In the Harriman loom a continuous supply of weft is maintained by changing the shuttle, and not, as in the

Northrop, merely the bobbin or cop in the shuttle. But whereas in the Crossley loom this change is accomplished while the loom is running at full speed, in the Harriman loom the weaving is temporarily suspended, and some little time is taken for the change.¹ Unlike the Northrop mechanism, which, in America at any rate, is only procurable in the form of a complete loom, the Harriman mechanism can be applied at a comparatively small cost to existing looms, whether of the 'over-pick' style, as used in Lancashire, or the 'under-pick,' as used everywhere in America. The mechanism of the Hattersley loom resembles that of the Harriman loom more closely than any of the other English looms which I have seen. The makers of the Harriman loom have associated with it an automatic pick-finder for twills and drills; also an electro-mechanical warp stop-motion, which consists of two rows of drop-wires and an insulated vibrator placed below and between them, which stops the loom when a drop-wire falls; a temple of special design; and a hand-threading shuttle, which removes the necessity for sucking the thread through the shuttle eye—a notoriously unhealthy practice. The Harriman looms at the Cabot mill were fitted with a stop-motion, the drop-wires of which weighed only 11 grains each, and therefore put a very slight additional strain on the warp threads. One weaver was running thirteen looms on the 39-inch sheeting with cop weft, and although the weaving price for this cloth had been reduced in the case of the Harriman looms by one-third, the man was earning from 42s. to 44s. a week. The manager told me that he expected to be able to give the weavers more of the Harriman looms each, and to reduce the weaving price to one-half of that paid on the ordinary looms.

There was one matter connected with the automatic warp-stop motion which I desired to have cleared up. I had been told that at one Fall River mill, where many good warps of combed Egyptian cotton, about 60's, were used, they used to run six, eight, and ten looms to a weaver without any warp-stop motion. They introduced a warp-stop motion, and at once were able to run all the looms ten and

¹ In one pattern of the Harriman loom the shuttle is changed while the loom is running.

twelve to a weaver. A neighbouring Fall River mill, hearing of this success, resolved to emulate it; but at this second mill the warps were not so good, and the weavers had been running only six and eight looms each. The same stop-motion was put on here, and a trial was made with ten looms to a weaver—with most disastrous results. The warps were continually breaking, and at the end of the first week it was found that the looms fitted with the stop-motion had produced only between 20 and 25 per cent. of the theoretical maximum. Needless to say, the stop-motion was taken off. The drop-wires were very light, but the warps were too tender to bear their weight and friction.

I therefore asked the manager of the Cabot mill whether he had not found it necessary to improve the quality of his warps, when he began to use the automatic looms and warp-stop motions.

‘Yes,’ he said; ‘instead of four-hank single roving, I am now using five-hank double roving and doubled (twisted) selvages. The total extra cost has been about .25 cent (one-eighth of a penny) per pound.’ He was satisfied that the economy in labour of 40 cents per loom per week far outweighed this and any other small additional expense incidental to their use.

From Brunswick to Lisbon (where I found the same loom working equally well with eight shuttles in the magazine and 100 bobbins packed on a tray over it, convenient to the weaver’s hand) was a most exhilarating tram ride through the forest. The track had been blazed straight through the timber for five or six miles, regardless of gradients, and, propelled by the power of the Androscoggin Falls, we flew up and down over a switchback road of ordinary railway metals spiked down to wooden sleepers. The forest was a solitude except for a sawmill here and there and some black smoke arising from amongst the trees, which betrayed the presence of a locomotive toiling along with a heavy freight train. But presently, far away on the left, crowning a beautiful wooded hill, we saw a building, like a great hotel, raising a tower to the sky. I asked what it was.

‘Well,’ said the conductor with a smile, ‘I guess you won’t believe me, but that belongs to a corporation called

the Holy Ghost and Us. Right there, in that tower, there are four people always praying.'

'But who lives there?' I asked.

'A lot of farmers,' said he, 'from all around the country, and their families. There's about 200 of them there now, and there's been several carloads from England, too, I reckon. When they go in they must pay all they have into the common treasury, and Mr. Sanford, who built the place, holds all the property in trust for the Lord. He's the sole trustee, according to their constitution, and, they say, a very good man. It's quite a proposition, ain't it?'

I agreed that it was indeed.

CHAPTER VII

The South—Conflicting opinions on Southern competition—An old Moravian settlement in North Carolina—The industrial awakening—An ingenious warp-dyeing machine—A journey into the wilderness—The ‘accommodation’ train—Cooleemee—A new mill village—Modern machinery and low piece rates—Southern weavers and the Northrop loom—Wages at Cooleemee—‘No labour laws, no schools’—Cost of a Southern mill.

NOTHING was harder to obtain in New England than trustworthy information about the cotton industry of the Southern States. At Lowell I was told that the Southern mills had already reached the limit of their advantage over the Northern mills in wages, that the ‘mountain whites’ were already fully employed, that the negro would never become an efficient machine-minder, and that whenever the South should come into competition with the North for immigrant mill labour the South would have to pay more than the North to get it.

Southern manufacturers, on the other hand, whom I met at Boston, said that there was plenty of labour still to be had, that the industrial resources of the South were unlimited, and that neither New nor Old England could hope to produce yarns and cloth as cheaply as mills surrounded by cotton fields and driven by water-power.

Yet another aspect of the case was presented to me by a man whose business takes him much among the cotton mills both of the North and of the South. In the Piedmont section of Virginia and its projection southward through the Carolinas and into Georgia—that is, along the main line of the Southern Railway—the machinery, he said, was well cared for, and the hours, as a rule, were not more than

sixty-six a week. But up-country both machinery and work-people had a hard time of it. Many country mills were paying dividends at the expense of their plant, which was depreciating fast, and by grinding the faces of the poor and helpless. He told me of children of twelve running a dozen automatic looms each for eleven or twelve hours a day; of girls of twelve drawing-in warps; of fathers carrying their children to the mill in their arms. In Virginia, he told me, there was some restriction on the employment of children; there they must be given two hours' rest in the working day of twelve hours; but some of the other States had no limit of age or hours for child labour.

The whites in the Southern mills, he thought, were more slaves than ever the blacks had been; they were not so well cared for, and they gained by their slavery just what the blacks used to gain—food, clothing, shelter—and nothing more. He told me of a mill in Georgia where the hands were paid only twice a year. During the six months they obtained the necessaries of life at a store owned by the mill; the prices were extortionate and the goods of inferior quality, and if any balance remained to their credit when the store bill had been paid, then, and then only, they received it in cash. His opinion was that the labour for the mills must be becoming scarcer, because many mills in country districts which formerly ran night and day had changed to day work alone for want of a sufficient number of hands for two shifts.

With such contradictory information in my possession, I turned South to find out what I could for myself.

For all practical purposes the North ends and the South begins, not at the Mason and Dixon line, but at Washington. Philadelphia is a Northern city, and so is Baltimore; but Washington is, if one may say so, on the United States equator. I felt the influence of the easy South first when I waited from 9.30 p.m. to 11 p.m. at the Washington railway-station for the train—the 'Florida express,' if you please—by which I was to travel my first stage towards the Gulf of Mexico. No matter that the train had been delayed by the heating of an axle-box between Philadelphia and Washington, I blamed the South for its unpunctuality, and later experiences have not made me feel that I did it any in-

justice. This very train, which with a good excuse had lost an hour and a half on its way to Washington, lost another hour during the night without any excuse at all, and pulled up at Greensboro, in North Carolina, two and a half hours late. It was in time, however, to make a connection with the accommodation train to Winston-Salem, where I was to visit a little cotton mill which, I had been told, contained a new warp-dyeing machine well worth seeing.

Winston-Salem is a town with a history, for in 1753 the Moravian 'Unitas Fratrum' bought 100,000 acres of land there and established a colony, which they called Walchovia. Bethbara was the name of their first village, Bethania was their second, and Salem (now united to the neighbouring town of Winston) was their third. The town is an old-fashioned, sleepy place, lately galvanized into life by the industrial revolution which has begun in the South, and still, as it were, rubbing the sleep out of its eyes. And the mill was like the town in epitome—small and antiquated in some ways, but very modern indeed in others.

An old-fashioned brick building, containing only 210 looms and enough spindles to keep them going, it is driven by electricity generated at a fall on the Yadkin River, thirteen miles away, at a cost to the mill of 52s. per horse-power per annum. It makes nothing but coloured goods—checks and stripes. Half of the people in the mill seemed to be between nine and fourteen years of age, and I was told that they worked sixty-nine hours a week. The weavers were running three and four looms each, and were earning 18s. 9d. and 25s. a week. For checked and striped ginghams, woven in 60-yard cuts 28 inches wide, 44 ends and 44 picks to the inch, with 12½'s twist and 14's weft, the weaving price was 25 cents. per cut; the speed of the looms was 150 picks a minute.

The warp-dyeing machine proved to be the invention of the mill-owner himself. It consists of a small colour bath with a pair of weighted rubber rollers, standing immediately in front of a developing, fixing, and drying apparatus, in which are a large upright steam-chest and a set of eight drying cans. The whole machine occupies 150 square feet of floor space, and stands 11 feet high. The chain of warp

is taken from a ball or beam in the dry state, passed through the small colouring machine, thence through the steam-chest, where the colour is fixed, thence over the drying cans, after which it is delivered again on the front side of the machine through a folder or coiler into a box or bag, dry and ready for the beamer or quiller. Some of the advantages claimed for this very simple machine are that it eliminates almost the entire labour cost of dyeing, and obviates the risk of injury and tangling to which the warps were exposed by the old methods; that a warp dyed in this machine can be beamed in about one-third less time than one dyed in the Scotch tubs, as there are very few broken ends; and that the saving in dyestuffs is about 20 per cent. The following particulars of work done by the machine at the Salem mill were given to me by the owner:

For 227,556 pounds of yarn actually dyed in the Scotch tubs with direct indigo blue:

Cost of dyestuff and materials	\$2,640
Ordinary labour	1,525
152 tons of coal	509
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Total	\$4,674
(or 2'05 cents per pound)			

For the same quantity of yarn dyed on the new machine:

Cost of dyestuff and materials	...	...	\$2,014
Ordinary labour	...	...	130
76 tons of coal	...	...	254
<hr/>			
Total	...	...	\$2,398
(or 1'05 cents per pound)			

In neither case is any allowance made for the wages of the 'boss dyer' or superintendent. These examples show a saving of 1 cent a pound by the machine in dyeing 227,556 pounds of yarn a full blue shade. Including 24,064 pounds of yarn dyed black, which cost in the Scotch tubs \$933, as compared with \$375 in the machine—a difference of 1'55 per pound—the average saving by the machine is shown to be 1'126 cents per pound, or just over 50 per cent. I was told that the capacity of the machine was 1,500 pounds of yarn a day, and that on a production of 1,000 pounds a day it would pay for itself twice over in one year.

At Salem a machine was running on two warps of 363 ends, 12½'s twist, at the rate of 43,022 yards, or 1,528 pounds, a day. Two men, it is said, can run nine machines. It is claimed for the machine that it will give excellent results with either basic or direct dyes from light shades to a full jet black, and that it is peculiarly adapted to the use of sulphur colours; also that the colours are much faster to washing and generally faster to light than those applied in the ordinary way. The fundamental idea of the process is, of course, to apply to the dry yarn only so much of the dry solution as will wet it and as will be retained by it under the constant pressure of a suitable rubber roller. The work is done so cleanly and the waste is so small that the machines can be put in any convenient part of the mill itself.

After Winston-Salem my next destination was Cooleemee—a place with no history at all, and not to be found upon any map that I have seen, but said to be somewhere about thirty miles along a single track of railway which connects Winston-Salem with Charlotte. According to the timetable, two trains ran along this track from Winston-Salem daily, and I had been advised to take the morning train. It turned out to be a freight train, consisting of eight or ten of the huge box cars in which nearly every kind of merchandise is carried in America, several open cars full of coal, and a brake-van. The passenger accommodation was a couple of exceedingly dirty bunks and three old chairs in the van.

The train stopped every few miles to drop or pick up a freight car or for some other inscrutable purpose, and every time it started, as the engine gathered up the slack of the couplings, there came a series of muffled reports ending with a bang and a forward jerk that nearly threw us in the van off our feet. The sun beat down fiercely, so fiercely that even when we stopped, as we often did, beside a charming meadow or bank of wild-flowers, none of us was tempted more than once to alight. Wild red honeysuckle, fields of young oats and wheat and cotton, the last looking at this early stage of its growth exactly like the tops of very young turnips; more fields oddly garnished with last year's corn-stalks; woods full of pines and oaks; blood-red Devonian earth wherever the soil appeared; men running along the tops of the cars at full speed to put on the brakes while the

train was coasting downhill—such were the sights that helped to beguile the tedium of this journey. When we had been four hours on the road the engine went away and left us. Nobody seemed to know why it had gone or when it would come back, but some wag suggested that it had only 'gone into the woods to look for acorns.' If so, its search must have been successful and stimulating, for it came back in five minutes, and very shortly afterwards we were deposited at Cooleemee.

Cooleemee Station, however, was something of a disappointment. It consisted merely of a water-tower for locomotives, a wooden shanty containing a waiting-room marked 'White,' another waiting-room marked 'Coloured,' and a baggage-room with a little crowd of men and boys, both white and coloured, sprawling about in the sun. That was all. A branch track led away to the left through a thick wood, and one of the Cooleemee mill officials, who had happened to travel from Winston-Salem with me, said that the mill was at the end of this branch line, two miles distant, and that a 'lever trolley' would arrive presently to take us thither. So we sat down on a log in the coolest part of the wood that we could find, and waited for it.

My companion said that in his opinion we had been fortunate to get any train to Cooleemee that day, because, as he remarked, 'to-day's train sometimes doesn't start until to-morrow, and if yesterday's train happens to have been on time you get pitched.' To be 'pitched' is, I find, a painfully common incident of travel in the South.

The lever trolley came along while we were talking, and turned out to be a four-wheeled velocipede made to fit the railway track, and propelled by a black man and a white man, with a sort of rowing motion of the arms and legs, quite as fast as we had travelled in the freight train. Black undoubtedly did two-thirds of the work, but I never saw a better counterfeit of energy than White's. Through the woods we sped at a good round pace, along the side of a river and past a small brick-field, at which I was told all the bricks for the mill buildings had been made and baked in the sun, and then, rounding a curve in the track, we came upon a remarkable scene.

In a woodland clearing beside the broad, rushing stream

stood two groups of buildings ; in the one group a few large buildings of brick and mortar—the mill itself, the cotton warehouse, and the commissary, or retail store ; in the other group many small buildings of wood—the dwelling-houses of the mill people, and a little hotel in which, my fellow-passenger told me, the officers of the firm lived. The mill buildings were but two years old, and looked very substantial ; the mill itself was three stories high, and had a tall and slender iron chimney, whilst 100 yards away the cotton warehouse with its loading platform stood beside the railway. This warehouse, I noticed, was connected with the mill by a suction pipe, through which the lint cotton from the bales could be drawn to the scutching-room.

The dwelling-houses were frame houses, every house self-contained, nicely painted, and provided with a little piazza or 'stoep,' so that its occupants could sit in the open air without being exposed to the sun. None of them had a garden, or even an enclosed yard, but in a place like this, where a minute's walk from your door takes you into a forest, a private pleasure-ground becomes a superfluity. The natural contour of the ground upon which these houses stood was hilly and rough, and no money had been spent in levelling it or in digging foundations. Every house was supported upon six or more brick legs, and the length of these legs was varied to suit the exigencies of the site. Sometimes, by reason of sloping ground, the house would have legs like a kangaroo's. The hind-legs, so to speak, would be so long that the family washing found convenient hanging room upon clothes-lines stretched from one to another, whilst the fore-legs might be only a foot or so in length. The effect of this form of construction, repeated again and again, was that of a village on stilts. The houses had some six and some four rooms apiece, and I was told that they were let at a uniform rent of 25 cents per room per week. There seemed to be nothing at Cooleemee except the mill buildings, store, hotel, and dwelling-houses. I saw nothing of any school or recreation-room, but I was introduced later to an Episcopal minister, who gave his assistance as a 'half-timer' in the office of the mill, and so I suppose that there is, or is about to be, a church in the neighbourhood. The whole place, I was told, is the

property of Mr. Duke, the head of the American Tobacco Trust.

The mill contains at present 25,000 ring-spindles and 800 Northrop looms, and when its equipment is completed it will have 40,000 spindles and 1,300 looms. All the cloth manufactured is for export, and consists of two kinds only—namely, China drills and sheetings or shirtings. The drills are 30 inches wide, weigh one-third of a pound per yard, and have 68 ends and 48 picks to the inch; the sheetings are 36 inches wide, are of the same weight as the drills, and have 48 ends and 48 picks to the inch. In both cases the yarns are 13·65's twist and 13·80's weft, the cuts are 120 yards long, and the piece rate for weaving is 13 cents a cut. The rate for weaving similar drills in New England I had found but a few days before to be 52½ cents for 120 yards, and that was less than the Lancashire rate. Here the cheapness of the Southern labour and the economy of the Northrop loom had enabled the superintendent to undercut the Northern weaving price by 75 per cent.

The weaving-rooms at Cooleemee were an agreeable surprise. It was, as I have said, intensely hot out of doors, and in the mill offices—large, airy rooms—everyone was working without coat or waistcoat; but in the weaving-rooms the air was pleasantly cool, far cooler and fresher than in some of the Fall River mills. The ceiling was high, the windows were wide open, and the air was moistened but refreshed by humidifiers which threw out a very fine spray of cold water.

I had been told in the office that the weavers ran from sixteen to twenty looms each, and earned a dollar a day, and as we went through the mill I asked some of them about their work and their earnings. One man, who was running twenty-four looms, told me that he could earn \$1.35 a day; two other men, who were also running twenty-four looms each, said they could make \$1.50; but when I came to question the women weavers I found a different state of things.

The first girl to whom I spoke was running ten looms, and gave her weekly earnings at \$2.08; the next, who had ten looms, too, said that she made \$2.50 a week, sometimes more and sometimes less; whilst the third, who had only eight looms, put her weekly earnings at only \$2, and com-

plained that she was not allowed to have more looms. I supposed that she was a learner, and asked her how long she had been weaving; to my surprise she replied, 'Three years.'

Now \$1½ a day from twenty-four looms means a production of nearly half a cut a day—say 60 yards—from each loom; whereas \$2 a week from eight looms, or \$2.50 from ten looms, means a production of less than one-third of a cut, or, say, 38 yards, per loom per day. It is to be inferred, from the employment of weavers who make such an uneconomical use of their looms as this, that the supply of good weavers at Cooleemee is by no means plentiful, and that no very small part of the apparent saving in wages per cut has to be set off against the charges on capital invested in costly machinery which is not doing as much work as it ought to do. The case of the eight-loom weaver with three years' experience may, perhaps, be set off against a statement made to me in Massachusetts to the effect that the Northrop loom is so easily managed that a totally inexperienced girl learned to run fourteen of these looms within a week.

Another point should be noted—the drills made in the Southern mills are not by any means so well woven as those which I have seen made in Maine, and since the difference in the prices paid for weaving, large as it looks, amounts, after all, to only one-sixth of a penny a yard, it may be more than covered by the difference in the prices which the drills will bring in the market.

The price of labour in the other departments of the Cooleemee mill I found to be as follows: The spinners, on twist and weft from 13's to 14's, are paid 10 cents per day per side of 102 spindles, and the spindles, which run at 8,500 revolutions per minute, produce 4 pounds of yarn a week each. The winders receive 6 cents for every 38 pounds of yarn wound; the warpers run six mills each (with the help of a creeler), and get 11 cents for every 18,000 yards of warp beamed; the slasher-tenters are paid \$1½ and \$1¼ a day; the drawers-in are paid 17 cents for a sheeting (1,728 ends) and 19 cents for a three-shaft drill (2,040 ends); the tacklers attend to 100 looms each for \$10 dollars a week, and unskilled labourers, including a

number of the blowing and card room operatives, have a wage of 70 cents a day. I was shown one of the wage-sheets, and noticed that the wages of twenty-seven persons amounted to no more than \$90 for one week. It is fair to say, however, that there was a great deal of 'broken time.'

The superintendent assured me that plenty of 'help' was obtainable from the farms in the surrounding country. In the Piedmont section, he said, the farmers brought up large families for almost nothing; the farms produced their food; the cost of clothing in the South, where men work in a cotton shirt and a pair of cotton trousers for nine months in the year, was very much less than in the North; and fuel, when it was needed, could be had for nothing in the nearest wood. Many of these people hardly ever saw money before the mills started, and now, according to my informant, they hardly know how to spend it. At this mill they were paid in cash every week, and much of what they earned was, he said, 'wasted on tawdry finery.'

'In this district,' he said, 'there are no labour laws, no school laws—in fact, no schools. But most of the mills in North Carolina, by common consent, observe a sixty-six-hour week, and we would rather not employ children under twelve years old.'

Experience seems to have taught the North Carolinian mill managers that it does not pay to work their hands an indefinite number of hours or to employ them indefinitely young, or it may be that by voluntary action they are trying to avert State interference.

Black and White, with the lever trolley, were waiting to take me back to the junction, but before I went the superintendent gave me some particulars of the cost of the mill. It was built there, in the wilderness, he said, because the water-power was there; the boiler whose iron stove-pipe chimney I had noticed was used only for heating and steaming and in connection with the slashing machines. The whole plant, including the water-power, buildings, and machinery, would, when completed, have cost \$16 per spindle, which he considered very little, taking into account the fact that the Northrop looms cost so much more than ordinary looms. With ordinary looms, he thought, the cost

would have been about \$13.20. The cost of the buildings themselves had been 60 cents per square foot of flooring, or 22s. 6d. per square yard—a figure which indicated that the cheapness of material had been offset by the scarcity of skilled labour for building. The floors were of 3-inch planks (as compared with the 4-inch planks used in New England), and were covered with two layers of 1-inch boards. The mill had been stopped by floods in the river for only three days since the beginning of the year, and the superintendent hoped soon to have it running night and day.

‘But,’ said he, as I took my leave, ‘we can’t do much when we have to pay 10 cents for our cotton.’

I doubt whether he was paying quite so much as that.

CHAPTER VIII

Rapid growth of the cotton industry in the Charlotte district—Charlotte to Columbia—White children at work, black at play—Columbia, South Carolina—A magnificent cotton mill and its cost—Difficulty of obtaining competent labour—Why negroes are not employed in the mills—Wages at Columbia—A country mill in South Carolina—Wood fuel—Day and night shifts—Children 'always falling asleep'—Indirect employment of very young children—The Harriman loom and its cost—A weaver in fifty-six mills—His opinion of the Harriman loom—The chain gang and its counterpart.

FROM Charlotte in North Carolina to Columbia in South Carolina the way lies still through the Piedmont country. If you described a circle about Charlotte with a radius of 100 miles, you would have within its circumference nearly 300 cotton mills, containing 3,183,350 spindles and 81,404 looms. The estimated number of cotton spindles and looms in the Southern States on January 1, 1902, was 6,250,000 spindles and 130,000 looms; therefore 50 per cent. of all the spindles and 60 per cent. of all the looms in the South are within 100 miles of Charlotte. There is very nearly twice as much cotton textile machinery within this circle to-day as there was six years ago.

Columbia, almost due south of Charlotte, is some fifteen or twenty miles within the circle, but the road between the two lies through a country very different from the districts that we associate with the idea of industrial activity. As one looks out of the windows of the train, one sees the red, red Piedmont soil—soil that looks as if it still bore the stains of the blood so freely spilled upon it in the Civil War, even as the handsome Capitol in the city of Columbia still bears

on its discoloured and shattered masonry the scars of Sherman's shells. Amongst the red ploughed fields are a few of a greyer complexion, and about them are miles of green-wood, chiefly pine and live oak. White honeysuckle and the common British ragweed, or something very like it, flourish on the edges of field and forest, but there are great gaudy butterflies to remind the traveller that England is far away. And whenever the passage of the train brings people and houses into view, the home-like look of things is quickly dispelled. Negro women in sun-bonnets are hoeing in the fields, and ragged children, both black and white, untroubled by any school inspector, are playing in the sunshine all day long. The white children are not always to be seen with their black brothers, for if there is a cotton mill within reach the little white will be at work, and the little black will be playing alone.

The sunshine is everywhere, and the heat, even in May, is so ardent as to bring out the full force and truth of that historic remark addressed by the Governor of North Carolina to the Governor of South Carolina, and to cause the stranger to lament that a climate which adds such zest to the drinking of iced liquids should add also to its penalties. In some of the fields the crops are coming up amongst the charred tree-stumps that have resisted the fire by which the land was cleared for the plough. Dotted about at wide intervals are the wooden cabins of the peasantry. Some of these tiny dwellings are whitewashed, but most of them have never known either paint or whitewash, and never will know them. Very poor and mean-looking they are, but the blaze of roses which you may often see beside the doors and the space and purity around them redeem them from the appearance of squalor. It is in homes and amid surroundings such as these that the population has been bred from which the newer Southern mills are drawing their labour, and the people have that fine physique which one finds in Irishmen bred even in the poorest country cabins. But one cannot see the stunted children in the mills without thinking of the physical degeneration in store for this fine race. Here and there a dark-brick cotton mill one or two stories high, surrounded by a huddle of small cabins, stands for the new order to which the old is giving

place, and as night falls the rows of brightly-lighted windows in these mills tell a tale of ceaseless activity strangely in contrast with the easy-going ways of the old South.

At Columbia, congregated at one end of the city, are half a dozen cotton mills, some large and new, others smaller and older, and in the newest mills may be seen at once the advantages and disadvantages attending the manufacture of cotton goods in the South. One of the advantages is the newness of the mills as compared with the mills of the North, for they have started with the most perfect machinery and the most improved methods of construction, arrangement, and so forth, whereas the older Northern mills are either old-fashioned in these respects or have been brought up to date by the expenditure of much additional capital.

One of these newer mills at Columbia is a four-story brick building, flanked by two handsome brick towers, and measures 552 feet long by 151 feet wide. The machinery is not yet all delivered, but when everything is complete there will be 104,000 spindles and 2,400 Northrop looms. The walls are double, with space between them for ventilation and heating; the elevator shafts are fireproof, and the lavatories provided for the use of the workpeople are furnished with polished marble, oak, and nickel-plated fittings, exactly like those of the best hotels in New York and Boston. The mill shafting is all turned by electric motors, and the cables conveying the current from the generators, together with the steam-pipes and water-pipes, are in a brick-lined subway or gallery. The power-house contains twelve vertical steam-boilers and three engines, with electric generators developing 6,000 indicated horsepower.

Close by there is a coal-yard, in which coal is deposited directly by the railroad cars, and from which it is brought by a small tramway into the boiler-room. At the time of my visit eight of the twelve boilers were in use, and three negro firemen were doing all the stoking. Three other men were working at the coal wharf, one loading the tramway trucks and two trimming. The wages of all these men were a dollar a day each. Each of the tramway trucks held one ton of coal; the truck was loaded by the negro in the yard in about three minutes, and the side of the truck next the

furnace doors was cut away, so that the fireman could shovel the coal directly out of the truck into the furnace. Underneath the floor of the boiler-house was a basement, with a similar tramway and trucks for taking away the cinders. This power-house drives not only this mill, but also a smaller mill a few hundred yards away; it likewise supplies electricity to light the city of Columbia and work the street-car service. The cost of coal delivered at the mill is 14s. 9d. per ton of 2,000 pounds, and I was told that they expected to 'get the consumption down to 1·6 pounds per horse-power per hour.'

Near the mill are a number of houses for the workpeople, and a store at which the company sells all kinds of provisions, clothing, and other household requisites; and fronting the store is a church, not yet finished, which is also being built by the owners of the mill. The cost of the mill building—that is, the complete shell, including the ornamental work on the towers and the maple floors—was 56 cents per square foot; including the cost of the lavatories—an extraordinary expense—it was 58½ cents.

Between this magnificent mill and much of the work that was being done in it there was, however, a remarkable contrast. I was told, quite candidly, that the management had found great difficulty in obtaining good 'help,' and from what I saw, in the spinning-room especially, I should say that the difficulty had so far proved insuperable. Some of the machinery was standing idle for want of efficient labour, and some of the machinery that was running was only spoiling cotton. Children seemed to be doing three-fourths of the work, and very young children many of them were. I spoke to one boy who said that he was just ten, to another who gave his age as nine, and to a third little chap who said that he was eight, and that there were plenty of boys in the mill younger than himself—'some only five.' I was glad to find no evidence in support of this startling assertion, and I hope that it was not true. Here again the mill superintendent assured me that he would rather not employ young children, but that he was forced to take them in order to get the older and more useful members of the family.¹

¹ In their evidence before the Legislature Mr. John B. Cleveland, president of the Whitney mills, and Mr. James L. Orr, president of

'We are offering,' he said, 'a dollar a day for good ring-spinners—that is, 20 cents more than any other mill in Columbia.' The difficulty, he explained, was that the mill was new; the older mills had all the help they wanted. Another possible explanation suggested itself to me when I learned that each spinner was expected to mind a whole alley of spindles running on medium counts—eight sides of 2,120 spindles—for a dollar a day. Even in Massachusetts I had never heard that any spinner, however dexterous, was given more than 1,456 ring spindles. The superintendent, however, contended that one good spinner 'could run the lot and sit down.'

The wages paid for labour in the picking (opening and blowing) room were 75 cents per day, and the labourers in this department were all negroes. No negroes were employed for any other indoor work at this mill, and although I have heard of one or two small bagging mills run wholly by negro labour, I am told that even here, in the Black Belt, negroes are not employed to any appreciable extent in the manufacture of cotton. The negro grows the cotton, harvests it, gins it, bales it, and brings it to the mill door in a mule-waggon, and sometimes he may open the bales and put the cotton into the hopper of the first machine which treats its fibre; but after that he gives way to white labour. Why?

Not because of race feeling, as is commonly supposed in England, and even in the Northern States, for in all sorts of other occupations one finds the negro and the white working side by side on good terms—like my friends Black and White on the lever trolley at Cooleemee. And not because the negro is driven out by the competition of the whites. I am satisfied that if the negro does not work in the cotton mills it is simply because he does not choose to. He has a child's impatience of any monotonous occupation that demands constant application and continuous vigilance; he dislikes to breathe the mill air, laden with moisture and fine particles of lint cotton; he loves the sunshine and the open sky, and

the Piedmont mills, showed that 30 per cent. of the hands in some South Carolina mills were children between five and twelve years of age.

he is loath to forsake them for indoor work unless that work ministers a little to his vanity and sense of dignity. That, I think, is why you will find George (all Southern negroes are assumed by the whites to be called George, and are almost invariably addressed by that illustrious name) wearing the evening dress of a waiter or the livery of a porter in a hotel, or serving as a conductor or assistant conductor on a Pullman car, and why you will not find him standing for eleven hours a day in front of a slubbing frame or a group of looms.

No doubt the negro's natural antipathy to such work would make him a poor workman if he were driven to seek employment in a cotton mill. But he seems to feel that the game is not worth the candle so long as he can live happily by working three or four days a week in the fields. 'I don't think that cotton mills wuz ever meant for coloured people,' was the opinion given to me quite frankly by a Columbia negro, and he expressed the general attitude of his race.

But let us return to the wages of the Columbia mill hands. I found a warper in charge of six warping mills, assisted by two little creelers; she received 20 cents per beam of 410 ends, carrying 21,000 yards, and could 'get off' from six to eight beams a day. This is as good pay as is received by the warpers at Lowell. The drawers-in were paid 25 cents for a two-harness beam of 2,460 ends, and 35 cents for a four-harness beam. One girl to whom I spoke had been at this work for only five weeks. She could draw-in a couple of two-harness beams a day, for which she received \$ $\frac{1}{2}$, and she said that some of the other girls could work twice as fast as she.

At this mill, as at Cooleemee, the number of Northrop looms run by a weaver varied with the weaver's skill. Many of the weavers were little more than learners, and had not more than ten or twelve looms; others, with more experience, had twice as many. The prices paid for weaving are indicated by the following examples: For a cloth 39 inches wide, with 64 ends and 64 picks to the inch, made from 29's warp and 40's weft, the weaver's pay was 11 cents per cut of 60 yards. This is the same price as I had found paid at Lowell for a 64-by-60 cloth woven on Northrop looms, but only 28 inches wide, with 28's warp and 36's weft, and in cuts only 53 $\frac{1}{2}$ yards long. For a

39-inch cloth with 80 ends and 80 picks to the inch, made with 29's warp and 40's weft and woven in cuts of 60 yards, the weaving price was either 16 cents or 18 cents per cut.¹ Both figures were given me (by different officials) at the mill, and I am unable to say which is correct.

In the cloth-room the folding machines were being run by boys, two of whom told me that they were nine years old. One of them was earning 35 cents and the other 40 cents a day; their work was not very arduous, and in spite of the long hours they seemed to take a considerable pleasure and pride in it. But, like nearly all the children I have seen in cotton mills, they were thin and small for their age. The cotton spun at this Columbia mill is 'strict middling' New Orleans cotton of $1\frac{1}{8}$ -inch staple, costing in May, 1902, $9\frac{3}{4}$ cents per pound.

The impression left upon my mind by my visit to this mill was that the supply of mill labour in the South was by no means unlimited, and that here it had been outrun by the demand. May is a month when it should be about high-water mark, for there is little to be done then on the farms. And yet the tide had not risen high enough to fill this great cistern which had been prepared at so great a cost to receive it.

The mill which I have just described is one of the 'show' mills of the South, a building embodying the latest developments of American cotton-mill architecture, equipped with the most perfect modern machinery and driven by electricity. In order to see something of the other side of the shield, I sought and obtained permission to visit a small country mill about thirty miles from Columbia, at a village which I shall call Barnesville.

Barnesville reminded me of those temporary wooden towns which the Royal Agricultural Society of England builds annually in some park or meadow for its great shows. There were not, of course, the teeming population, the gay colour and movement of bunting, the hum of machinery in motion, and the myriad signboards of the exhibitors; but the absence of made roads, the wooden houses, the rapidly-

¹ Compare this with 40 cents per cut of 54 yards paid at Brunswick, Maine, for weaving a 39-inch sheeting, 72 ends and 80 picks per inch, made with 28's warp and 37's weft.

grown flowers, and the way in which the buildings seemed, by their arrangement, to recognise that the trees were the permanent inhabitants, and themselves mere visitors, gave the whole place the air of a temporary encampment. Barnesville might be taken down, packed up, and carted away, in a few days, and its site, except for a few slight scars which Nature would quickly heal, would bear no trace of man's occupation.

Many of the houses belong to the mill, and are let to the mill hands at a weekly rental of 15 cents for each room, so that a four-roomed house can be had for 2s. 6d., and a six-roomed house for 3s. 9d., per week. The mill itself consists of a three-story brick building in which there are 5,800 spindles with their ancillary machinery, and a one-story weaving-shed, lighted from the sides, containing 350 looms, 50 of which were of the Harriman automatic type, and had been recently installed. The carding and spinning plant had been running day and night, and had been producing 36,000 pounds of twist and weft (averaging 14's) per week of 130 hours. The goods produced are drills and sheetings for export. Power is obtained from a steam-engine, and wood is burned in the furnaces. I was told that the cost of fuel, labour, engineer's wages, and supplies came to \$32, or £6 13s. 4d., per indicated horse-power per annum. This would be equal to about £3 6s. 8d. if the mill were running by day only—*i.e.*, sixty-five or sixty-six hours a week.

Day and night work was arranged as follows: The day shift worked from 6 a.m. to 6.40 p.m., with forty-five minutes' interval for dinner, except on Saturdays, when the hours were 6 a.m. to 12 noon. The night shift worked from 6.40 p.m. to 6 a.m., with only fifteen minutes—about midnight—for refreshments. The manager told me that if a longer rest were given the hands would fall asleep. On Saturdays the night shift started at noon, and worked on without any stoppage of the engine until 9 p.m. The engine therefore ran twenty-three hours a day for five days and fifteen hours on the sixth day, making a total run of 130 hours a week. There was no interchange of *personnel* between the day and the night shifts; one set of men, women, and children worked always by day, another set

always by night. The only exception to this rule was the manager himself, who had no night substitute.

'But do you come here at night too?' I asked him.

'I don't always stay all night,' he answered simply; and his words revealed him as at once the instrument and the victim of oppression.

Clearly he hated the system, and had doubts even of its commercial wisdom. Apart from the cost of lighting the mill, the night shift had to be paid more than the day shift, he said, and no amount of driving would get equally good work out of them. The manager seemed to think that the main objection to the employment of very young children at night was their inability to keep awake.

'They are always falling asleep,' he said, 'so we have as few of them as we can.'

The wages paid at the Barnesville mill were, on the whole, appreciably lower than at Columbia. In the picking-room the men attending to the feeders were paid 75 cents, and those attending to the finisher-scutchers \$1, a day. At this work the pay of the day and night shifts was the same. There were sixteen carding engines run by a day stripper at 20s. 10d. a week, and a night stripper at the same wage; the grinder (there was only a day grinder) received 31s. 3d., and as the cards ran day and night his work was equivalent to grinding thirty-two cards under ordinary conditions. The drawing-frame hands received 60 cents per day or night; the slubbing-frame hands were paid 4½ cents a hank, and earned on the average \$1 a day, or 25s. a week; and the roving-frame hands were paid 7 cents a hank, and made from \$1 to \$1¼ a day, or from 25s. to 31s. 3d. a week. These were all adults.

The spinning frames were run by children and girls from eight or nine to eighteen years of age. The firm professes not to employ children under twelve, and I was told that the younger children whom I saw came in to help their sisters. I had met with the same thing in the State of Rhode Island, and it is hardly necessary to point out that the difference between employing a child in your mill and employing that child's mother or sister on terms which induce her, with your permission, to call in the child's assistance is a matter of form, and nothing more. The

Massachusetts law, as I have shown in an earlier chapter, meets this evasion by forbidding young children to work in a mill for anybody. The Southern mill-owners are not evading the law, for, except in Louisiana and Tennessee, I believe, there is no law for them to evade; if they employ very young children indirectly, through their mothers or sisters, instead of directly, it is presumably because the children will work better in that way, the maternal or sisterly authority being at this tender age more effectual than the official.

The rates of pay for spinning counts averaging 14's on ring frames with 112 spindles per side, running at 8,000 revolutions a minute, were: Day shift, 10 cents per side for twist and 11 cents for weft; night shift, 12½ cents for twist and 13½ cents for weft. The spinners ran from two to six sides each, and therefore earned in the day shift from 5s. to 16s. 6d. per week, and in the night shift from 6s. 3d. to 20s. 3d. a week. The day doffers earned 10s. and the night doffers 12s. 6d. a week. The winders were paid after the North Carolina custom—that is, they each had to keep pace with six sides of spinning frames, and received the same pay per side as the twist spinners. The warpers received a standing wage of 85 cents a day or a dollar a night, which is equal to 21s. 3d. a week for the day shift and 25s. a week for the night shift. They ran three warping mills each, and there was one creeler to the three mills, who received about 70 cents a day or 75 cents a night. Two slasher-tenters were employed, the day man at 32s. 6d. a week, and the night man at 25s., the latter being an inferior workman. The girls employed at drawing-in worked, of course, by day only, and could earn from 3s. 4d. to 5s. a day.

The weavers at Barnesville ran from four to six ordinary looms or from eight to ten Harriman looms each. The four-loom weavers could earn from 60 to 70 cents a day, and the six-loom weavers from 90 cents to \$1.15. 'It is a poor weaver,' said the manager, 'that cannot earn a dollar a day.' If that is so, most of the Barnesville weavers were poor weavers.

One of the drills woven at this mill was 30 inches wide, with 40 picks of 14's weft to the inch, for which the

weaving price was 16 cents per cut of $62\frac{1}{2}$ yards on the ordinary looms and 14 cents per cut on the Harriman looms. For a 37-inch three-shaft drill, 66 ends and 36 picks to the inch, 14's twist and 18's weft, the weaving price for the ordinary looms was $17\frac{1}{2}$ cents per $62\frac{1}{2}$ -yard cut. A standard export sheeting was also woven here, 36 inches wide, 48 ends and 48 picks to the inch, $13\frac{1}{2}$'s twist and $14\frac{1}{2}$'s weft, weight 3 yards to the pound. The weaving prices for this were, I believe, 12 cents per $62\frac{1}{2}$ -yard cut for the Harriman looms and 14 cents for the common looms, but I am not quite sure of these figures. They are much higher than the weaving price for a similar sheeting woven on Northrop looms at Cooleemee. The Harriman looms cost, I was told, \$110 $\frac{1}{2}$ each without the warp stop-motion, and with it \$25 more.

The Barnesville mill did not seem to be short of labour, but I learned before I left that the spinning department was about to stop running at night—I suppose for want of remunerative employment. This meant that a portion of the looms would be stopped also, and on my way back to Columbia in the train I fell in with one of the weavers who had just been thrown out of work. This misfortune gave him no concern at all, or if it annoyed him it was only because it marred an odd kind of record of which he seemed proud.

'I'm a rover,' said he. 'Yes, I've worked in fifty-six different cotton-mills—fifty-six'—he repeated the incredible number with infinite satisfaction—'and I've never been "stuck" until now. And now I've only been turned off because they're stopping the night work.'

He had been running ten of the Harriman looms at Barnesville, and he told me that with these ten looms he had woven as many as fifty-nine cuts of the narrow drills in one week. He thought the Harriman loom a very good loom, and said that he could run twelve of them easily.

This man was an example of the nomadic character of American labour. It is by no means unusual for a man, with his wife and family and household goods, to drive up in a waggon to the door of a Southern country mill at four or five o'clock in the afternoon and offer their services. The manager is nearly always glad to have them, and sees that

they are housed before nightfall. I myself have seen a whole trainload of workpeople—men, women, and children, with their beds, bedding, and cooking utensils—travelling from Georgia to a new mill in North Carolina.

As the train came into Columbia a curious little procession passed up the street. About a score of black convicts, dressed in an ugly uniform of dirty white cotton with broad black stripes, carrying picks and shovels over their shoulders, and chained together, two and two, by the ankle, swung up the hill, followed by a white man with a rifle. It was the chain gang returning from its day's labour upon the roads. And about the same time, I suppose, white children of twelve years old, no more free agents than the convicts, were filing into the mill at Barnesville to begin their long night of toil amongst the tireless machines.

CHAPTER IX

Augusta, Georgia—Municipal power canal—The King Mill labour dispute—A well-informed Baptist minister—His version of the quarrel—Character of the operatives—Visit to a strike commissary—The men's version—A determined resistance—The plan of campaign—Camping out by the Savannah River—The end of the strike—Work and wages at Augusta and the Horse Creek—The Enterprise Mill—Insurance and taxes—Raw material and freight.

AUGUSTA, just within the borders of Georgia, and sixty or seventy miles south-west of Columbia, is one of the oldest and most considerable seats of the cotton manufacture in the South. The city was founded beside the falls of the Savannah River in 1735, and it is mainly to the power of these falls that it owes its nine cotton mills and the comparative prosperity of its 40,000 inhabitants. The construction of the Augusta power canal was begun by the city in 1845, and its enlargement was completed in 1875. Fourteen or fifteen thousand horse-power are developed and sold to the industrial establishments of the city at \$5½ (22s. 11d.) per horse-power per annum, a rate which is said to be the lowest in the United States.

The nine mills within the boundary of Augusta contain 193,000 spindles and 5,650 looms, the largest being the King Mill, with 60,384 spindles and 1,812 looms, engaged in the manufacture of sheetings, shirtings, and drills. The other mills make, in addition, ducks, checks, plaids, batting, waste, and yarn. A few miles from Augusta, in a district of South Carolina called the Horse Creek, are five other mills with 154,500 spindles and 4,674 looms, making drills, sheetings, shirtings, and print-cloth. At Clearwater, about three miles

from Augusta, a bleachworks with a capital of about £60,000 is being built—the first large bleachworks, I believe, in the South.

It was Saturday afternoon when I arrived at Augusta, and my first Augustan acquaintance took me for a drive through the city and out into the beautiful high-lying country on its northern side—a country of woods, hay-farms, 'truck-gardens' (that is, market-gardens), and plantations. On the way he gave me the first of several versions which I was to hear of the great labour dispute then in progress at the Augusta and Horse Creek cotton mills. The trouble, he said, began at the King Mill. The workpeople asked for an increase of 10 per cent. all round in their wages, and when this was refused they came out on strike. Thereupon the Augusta Manufacturers' Association, which comprises all the mills in the Horse Creek and most of those at Augusta, met and decided upon a general lock-out, so that their workpeople might not be able to contribute to the support of the strikers. Of the Augusta mills not in the association, one had been closed for some time before the strike; another was not yet complete and ready for work; a third made nothing but waste, batting, and paper stock, and had therefore no interest in the quarrel; the fourth—a small mill with 4,100 spindles and 224 looms, making heavy goods, was still running. Both sides had held out for many weeks, he said, although several attempts had been made to reconcile them, and he did not think the end would come until the resources of the men were exhausted. But Mr. —, a Baptist minister, who was in close touch with the working people, could tell me far more about the dispute than he.

The minister very kindly came to see me next day. His acquaintance with the affair had been gained primarily from his contact with the mill people, amongst whom he did missionary work, and secondarily from a week's employment as special strike reporter for one of the Augusta newspapers during the temporary absence of the regular man. His attitude was one of general sympathy with the workpeople, tempered by a distrust of trade-unionism, which in his case, I think, sprang from a narrow outlook upon industrial economics and by that readiness to believe a master's word

rather than his men's which, in small towns like Augusta, is often to be explained more upon social than upon judicial grounds. However, I shall try to give my informant's version of the dispute as I received it, supplementing it by a second version from a different source, in the hope that by comparing one with another, as in the 'Ring and the Book,' the reader may divine the approximate truth.

In the Augusta district there are, the minister said, four cotton mill trade-unions—namely, the Loom-fixers', the Weavers', the Spinners', and the Carders' and Doffers'—which comprise about 35 per cent. of all the adult mill hands as open and avowed members, and about 20 per cent. more as unavowed members. These four unions have a joint district council, which has power, as my informant put it, to 'put on and call off strikes,' and through which the unions take common action. In January last (it was now late in May) Albert Hibbert, the English secretary at Fall River of the United Textile Workers' Union of America, came down to Augusta in connection with a small dispute at the Graniteville Mill—a dispute which was settled by concessions from the management—and he remained for some time making speeches, in which he contrasted the position and earnings of labour in the South with those of the hands in the North. Shortly afterwards the hands at the King Mill, the largest mill at Augusta, complained that their earnings were not so good as those of the hands at the other mills, although the rates for piece work were supposed to be uniform; they complained in particular of the length of the 'cuts,' or woven pieces, and insisted that cuts which measured from 57 to 59 yards in the other mills measured from 60 to 65 yards at the King Mill.

'Without previous remonstrance,' my informant said, 'they sent in word that unless this was immediately rectified or 10 per cent. added to the piece rates at the King Mill they would strike in a week.' This was done with the knowledge and sanction of the district council, and, as their demand was not complied with, all the union hands at the King Mill struck on April 3. The non-union labour was insufficient to run the mill, and it was accordingly closed down.

Meanwhile the Manufacturers' Association had met and

had given notice that if there should be a strike at the King Mill the hands at all the other mills in the association would be locked out, and on the day after the strike this threat was carried out. About 7,000 people were thus thrown idle. Hibbert came down again from Fall River to advise and direct the men, and at a meeting of the district council it was resolved that a deputation consisting of employés of the King Mill should go to the Manufacturers' Association and explain their grievances against the King Mill management. This meeting took place, but the association decided that the King Mill management and their employés had better thresh it out together. The men accordingly got up their case, with evidence to support their charges, and laid it before the management, whose reply was a denial of the charges and an assurance that they could not afford a 10 per cent. advance. At this stage the Manufacturers' Association and their superintendents inspected the accounts of the King Mill—they have, it seems, the right to examine the wages account of any mill—and declared that they found the charges against the King Mill not substantiated.

The negotiations for a settlement thereupon broke down, and the district council of the unions opened two commissaries or stores for the supply of rations to their members, and, as far as possible, to the non-union hands thrown out of work by the dispute. They started by issuing \$2 worth of stores to each member per week, but this had been gradually diminished as less and less money came in from headquarters in New England. The first grant was \$500, and the minister thought that not more than \$1,200 had been received during the three previous weeks; the local organization had practically no accumulated funds, but individuals had saved money. The unions had taken in a great many new members just before the strike to prevent 'black-legging,' and this had weakened them financially. Before returning to New England, Hibbert had advised that the King Mill strike should not be abandoned without the assent of a majority of the local union members in good standing.

A majority of the Augusta mill hands, my informant went on to say, were the families of ruined tenant farmers who came into this district from the country almost penni-

less. The mills provided work for the wives and children, but not for the older men, who lived largely upon the labour of their families, and occasionally picked up odd jobs where they could. He thought that the Southern mill operatives were relatively not much worse off than their fellows in Massachusetts, because living was so much cheaper in the South.

'They are handling more money than they ever saw before in their lives; some of them own their houses, some have furniture worth \$100'—bought, as I discovered later, on the hire-purchase system—'and others have bought farms in the country and gone back to farming. Their clothes are lighter and cheaper here than in the North, the cost of fuel is less, rent is less, and girls can board here for from \$6½ to \$8 a month. They suffer from pulmonary diseases, but otherwise they are fairly healthy—better than in the North. They are, as a rule, orderly, sober, and religious—members of churches and of orders such as the Oddfellows, the Red Men, and the Knights of Pythias.'

Such were the arguments by which this good man, like many other Southerners who do not themselves work in mills, tried to convince me that the lot of the Southern mill hand was as good as that of the Northern. But surely there is a flaw in the argument somewhere, for otherwise we must believe that the noble savage of the tropics, who wears no clothes at all, uses no fuel, pays no rent, and gets his food without money, and almost without labour, is far ahead of all American workmen.

Seated on an empty sugar-barrel under the shade of a mulberry-tree in the backyard of the Augusta commissary, I heard next day the work-people's side of the story from one of their own leaders. I had entered the commissary—a sort of wooden pavilion—through a dense throng of waiting women and children, waiting with cans and baskets and bags for their turn to exchange their orders for supplies. They were talking and laughing and grumbling good-humouredly; good-humour and a certain amused compliance with the democratic discipline of the commissary were, indeed, conspicuous elements in the behaviour of the crowd, and I do not think that their six or seven

weeks' holiday had done them much harm. Within the building was another throng of people being served with bacon, flour, meal, coffee, sugar, syrup, and similar commodities, and on the walls the following official notices were displayed:

'Gentleman will please not spit on the floor.'

'No playing or fighting aloud here.'

'Goods given away will not be taken back'—the last, surely, a pleasantry.

Here I presented a letter of introduction to William Hanley, 'General Manager of Store No. 1,' who passed me on to George Johnson, 'Chairman of the Relief Committee,' who in his turn invited me to a seat on the sugar-barrel under the mulberry-tree.

The sun was shining with its accustomed ferocity, and the grains of sugar left in my barrel and in others near it had attracted some thousands of flies. The Chairman of the Relief Committee noticed my vain endeavours to keep them at bay, and explained:

'These flies are quite tame; you want to push them before they will go away.'

He was right; you had, as it were, to take the fly by the shoulders and 'move it on' bodily.

My companion, who was by this time seated on another cask, which, I am sure, had contained molasses, was an alert-looking young man of five-or-six-and-twenty, a weaver of fancy coloured goods at the Sibley Mill. His account of the dispute differed somewhat from the minister's.

The King Mill, he said, paid their card-strippers 90 cents a day, the same as the Sibley Mill; but whereas the Sibley men stripped only twenty-four cards each, the King men had to strip thirty-four of the same pattern. In spinning, for sides of the same length, the King Mill paid 12 cents and the Sibley Mill 13 cents. Six-loom weavers at the King Mill could make on plain sheetings 90 cents a day; at the Enterprise Mill on the same goods, at the same price per cut, they could make \$1.04 per day. And it was the same all through. He explained the difference in the weavers' wages by saying that the cuts, although supposed to be of the same length, were actually longer at the King Mill.

I suggested that this could be easily decided by having the cuts measured in the presence of the weaver.

'Yes,' he said, 'of course it could; but that's one of the grievances. At the King Mill the weavers are not allowed to measure the cuts or to see them measured. At the Enterprise Mill, if there is any question about length, the cuts are measured with a tape in the weaver's presence; and it is the same at the other mills. The King Mill is the only one that doesn't give that privilege.'

'We have no quarrel with the other mills,' he continued. 'They treat us all right at my mill, the Sibley—and they say it's the best paying in the South. It has sometimes happened that the price fixed for weaving a new sort of cloth has been too low, and we have complained and asked for more. Well, the boss has gone into it, and has sometimes given us more than we asked.'

I asked why the King Mill workpeople, instead of striking for a 10 per cent. advance in wages, did not simply demand the right to see their cuts measured and the redress of any other specific matters in which they could show that they were worse off than the people in the other mills.

'Well,' said Johnson, 'perhaps it might have been better. But they only asked for the 10 per cent. when they found they couldn't get the other things put right. The masters say they must manage their business in their own way, so we say, "All right; but you must make it up to your help in the wages."'

'But,' I urged, 'the Masters' Association went into the books and found that the King Mill was paying the same as the rest, didn't they?'

He laughed.

'We know what we earn,' he said, 'and they might be paying the same rate per cut to the weavers, or per box to the winders, or per side to the frame-spinners, but there might be more cloth in the cut, and more yarn in the box, and more spindles to the side. And, besides, the book-keepers of some of the mills told us that they had been ordered to make out special wage-sheets to show that the rest of us were not getting more than the King people. Oh, that's easily done.'

'Have you any proof that the King Mill cuts were longer

than the others,' I asked, 'or is it only an inference from the wages?'

His answer was that some of the weavers had put a piece of string into their looms so that it was taken up with the woven cloth, and had found, on measuring the string, that the average length of the cuts was 65 yards, as compared with 59 or 60 yards at the Enterprise Mill.

The trade-unionists of the Augusta mills were formerly associated with the International Textile Workers, and had to pay a contribution of 15 cents. per quarter per member; 'but now,' said my companion, 'we are in the United Textile Workers, and only pay 5 cents. The treasury was very low when the strike began, but we are receiving \$2,200 a week from the United Textile Workers, upon whom a levy of 10 cents per member per week has been made to support us.'

'That doesn't seem much for seven thousand people,' I suggested.

'No,' he said, 'but about a thousand have already left the district to work in other mills. The Strike Committee spent \$600 in assisting them to go. Some have gone as far as New Jersey, and hundreds to Atlanta, Pelzer, and Union. Then, five hundred people from the Augusta mills have encamped along the river and canal on land that belongs to the city. They are living in old army tents that were occupied by the United States troops sent down here during the big strike three years ago. When the soldiers went away the tents were sold dirt cheap—the very best only fetched \$1—and a lot were bought by a Jew here, who has sold them to the strikers. The campers-out gather wood on islands in the river which belong to the United States Government, and we give wood, as well as medicine, free to anybody who needs it. The Chairman of the Wood Committee—he's down at the lock now with a mule team getting a load of firewood—has a brother at Lowell, and he's going there just as soon as he hears there's a job for him. The only way we can whip the masters this time is by lighting out for other districts. They don't mind having their mills closed,' he explained, 'because with cotton so dear they can't make much money anyhow just now—and that's our bad luck—but they don't like to see the skilled help going away.'

I asked what the people did who lived in houses owned by the mill companies—were they evicted?

'No,' was the answer; 'they don't charge rent during a strike or lock-out, and they don't evict unless they want to start on "scab" labour. But they won't try that again. They got "pitched" over it three years ago when they made a lot of tent canvas for the Government that was rejected and couldn't be sold at any price.'

'But what about the rations?' I asked. 'How do you make them go round?'

'Well,' he said, 'before the strike we promised to allow the strikers \$2 a week in cash all round; but when they locked us out from all the mills of course we couldn't do it, and there was some right smart kicking at first when we offered food instead of money. But now they see it's the best plan. We give every union man an order for 75 cents every week, 50 cents to his wife, and 50 cents for each child—store orders, you understand.'

'And what about the non-union families?'

'Well,' he said simply, 'we don't allow anyone to perish. We carry at the stores a full line of groceries, tobacco, and snuff. At this store we are spending \$1,500 a week, and have 1,350 members drawing rations, besides wives and children; and at the other store, in the Horse Creek, we are spending \$700 dollars a week on 500 members. The people who are camped out fish in the river; some of them have built fisheries—traps—and they catch more fish, mostly catfish, than they can eat, and sell them in the city. They draw meat, meal, and coffee from the commissary, but not the full amount.'

I began to understand why some, at any rate, of these poor people could sustain the privations of a lock-out for so many weeks so cheerfully. Picture, if you can, the nature of their holiday, and the contrast. Instead of working for sixty-six hours a week in the cotton mills—those are the legal hours in the State of Georgia for men, women, and children—these sons and daughters of the soil had gone back to the land, and were living once more in the open air. Encamped in tents by the riverside, they were free to fish and to roam in the woods—woods of persimmon, red oak, hackberry, water-oak, yellow pine, sweet-gum, hickory,

wild-cherry, elm, cedar, catawba (the leaves of which nourish a juicy black worm much esteemed by anglers), and honeysuckle. Remember that camping-out is almost a passion with town-dwelling Americans, and that their climate and laws enable them to indulge it with the fewest of attendant discomforts.

If the money had continued to come in from New England I do not think that the mills would have started again until the market had turned so much in the manufacturers' favour as to induce them to bring pressure upon the King Mill to settle with the strikers. But start they did a few days later, without having had to make any concession to the men; and I can only suppose that the United Textile Workers in the North grew tired of providing the sinews of a war which bade fair to drag on indefinitely. The men were beaten, but if mills continue to be built in the South at the present rate, a day will come when they will win; and after that, if they are wisely led, the levelling up of their wages and conditions of labour to somewhere near the Northern standards will be only a matter of time. For good spinners and weavers are already as much sought after in the South as good cooks and housemaids in England.

Before I left him I obtained from my informant the following particulars of the work and wages at the King Mill and other mills in and about Augusta:

The King Mill, he said, spins and weaves only coarse counts, from 13's to 21's. The machinery in the blowing-room is modern, and is tended by coloured labourers at 85 cents a day. In the card-room there are a few coloured sweepers at 70 cents a day, but all the rest of the labour in the mill is white. There are two kinds of carding engines in use—old boxed-in Lowell machines, turning out about 540 pounds a week, and new 'revolving flats,' carding about 750 pounds a week. One grinder at \$1.30 a day takes care of thirty-four of the old cards, and a grinder at \$1.50 a day has forty-eight of the new cards; there is also a stripper, at 90 cents a day, to each grinder. The drawing-frame hands are paid 70 cents a day; the slubbing-frame hands get 7 cents a hank and run 120 spindles, turning out twenty hanks a day; the intermediates receive 6½ cents

a hank for the same number of spindles, and average eighteen hanks a day; whilst the rovers, with as many spindles and a similar output, are paid 6 cents a hank. The pay for spinning is 12 cents per side of 120 spindles, the spinners running from four to eight sides each. For spooling the rate is $5\frac{1}{2}$ cents per box—about 56 pounds. There are from forty to seventy-two spindles per side, and the winders have one side each. A good day's run for a 'whole' side is eighteen boxes.

The warpers run from two to four warping mills each, with the assistance of a creeler—a child—at 60 cents a day; the warper is paid 23 cents per beam of from 460 pounds to 520 pounds, and can easily earn $\$7\frac{1}{2}$ (31s. 3d.) a week with four mills, or with two mills $\$5$ (20s. 10d.) a week. The slasher-tenters, or tapers, receive $\$1.15$ a day, or 28s. 9d. a week; they have one machine each, with a helper at 18s. 9d. a week, or 75 cents a day, and the daily output of each machine is 520 cuts of 65 yards.

At this mill (the King) the size of the looms is from 32 inches to 43 inches reed space; they make sheetings or shirtings and three-shaft drills, and the weavers run from four to eight looms each. All the looms are ordinary looms, without any warp stop-motion, and ring weft is used on a $5\frac{1}{2}$ -inch bobbin. For 30-inch sheetings, woven with 13's warp and weft, 48 picks per inch, the weaving price is $15\frac{1}{2}$ cents per cut of 65 yards, and each loom weaves about five cuts a week. For sheetings of the same description, but from 36 inches to 40 inches wide, the price is 23 cents a cut, and the weavers run as many of the wider looms as of the narrower. The three-shaft drills are 30 inches wide, have 13's warp and weft, with 42 picks to the inch, and are paid for at the rate of 16 cents per cut of $62\frac{1}{2}$ yards. The looms each weave six cuts of the drill a week, and the weavers must find the pick and make perfect cloth. 'They pay,' said my informant, 'either the full rate or nothing, and there has been lots of trouble over imperfect cloth. They don't notify the weaver or show him the fault, but just dock the wages.' The wages at the King Mill, he said, taking them all round, were 40 per cent. lower than in New England.

The Sibley Mill, where he himself worked, made gingham

and fancies, and had dobby looms with as many as twenty-six staves. The weavers ran six dobby looms on plain work or four dobby looms on fancy work, or from four to six plain looms with drop-boxes. Their earnings on six drop-box looms would average 31s. 3d. a week, on four drop-box looms 22s. 6d., on four fancy looms 37s. 6d., and about the same on six dobby looms. These would be the earnings of the best weavers, and the wages paid by the Sibley Mill attracted good men.

I had heard the Enterprise Mill at Augusta spoken of as an honourable exception to the Southern rule of employing young children,¹ and I was glad before leaving the city to have an opportunity of learning from one of the chief officials of the mill something of its administration. The mill buildings, he said, dated from 1882, but the machinery—33,000 spindles and 928 looms—had been renewed between 1898 and 1900. Fire insurance with the mutual companies cost \$800 a year for \$450,000 at risk, or rather more than one-sixth of 1 per cent. Mills insured with the stock companies (first-class risks) paid one-fifth of 1 per cent. The city taxes were $1\frac{1}{4}$ per cent., assessed on very nearly the full market value of the plant, including the ground; the State and county taxes were $1\frac{1}{4}$ per cent., assessed on three-fourths of the value. The cost of coal at the mill was about 13s. 6d. per ton, but the driving was done by water at 23s. per horse-power per annum.

The goods made at the mill were grey sheetings, shirtings, and drills, all of 18's and 19's yarn, unless ordered otherwise, and domestics of 4 yards to the pound or lighter; and most of the goods were sent to converters in New England to be bleached and finished or printed. Some other mills in the district, he said, made regular 64-square print-cloth on Northrop looms, paying from 7 cents to 8 cents a cut to the weaver. At the Enterprise Mill they were trying the Harriman loom, twelve to a weaver, with encouraging results so far.

¹ Between 500 and 600 children, from five to twelve years of age, are employed in the cotton mills at Augusta. A recent investigation showed that only about 20 per cent. of these could read or write, and they were children who had not gone to work until after they were ten years old.

I told him that the Northrop loom weavers at Lowell were getting 3 or 4 cents a cut more for the 64-square print-cloth than the Augusta weavers. He replied that the cost of living was much greater in the North.

'Here,' he said, 'a man works for eight months in the year in his shirt and trousers, he needs less meat, and he lives in a house that is neither plastered nor ceiled. Some of the houses owned by the mills let at 33 cents per room per month.' I think that he must have meant to say per week, for a house agent who has the letting of many of the mill cottages at Augusta told me that the rent of a house with two rooms and a cook-house averaged \$4½ or \$5 a month, and the rent of a four-roomed house \$7 or \$8.

Good eight-loom weavers in Augusta, said my friend of the Enterprise Mill, could earn about \$1¼ a day; ring-spinners (from twelve to sixteen years of age) were paid about 11 cents a side, and could run from six to eight sides of 108 spindles each; rovers would make about \$1¼ a day; and warpers, running four or five mills with the help of a young creeler, would earn about a dollar a day.

The cotton used by the Augusta mills was, he said, upland cotton, of local growth and short staple—that is to say, from 1½ inches downwards; they bought by the Liverpool classification, and the average quality would be Liverpool 'good middling.' The annual receipts of the Augusta cotton market have reached 378,500 bales, of which about 100,000 bales are consumed by the local mills; these buy in their own market from \$4 to \$5 a bale cheaper than the cost of cotton delivered in New England. The average weight of the bale at Augusta is 485 pounds, so this means an advantage over New England of a cent a pound.

The freight on manufactured goods from Augusta by river to Savannah and thence by sea to New York, Boston, Philadelphia, or Baltimore, is 35 cents per 100 pounds, and the rate by rail, on account of the competition by water, is only 41 cents, as compared with 50 cents from the Piedmont district of South Carolina, which is nearer to New York, but has no competing water route. Most of the Augusta goods are sent by the river and sea route.

CHAPTER X

Atlanta and its associations—'Up-to-dateness'—A race riot—A prosperous country mill—A mill at Atlanta—Dear power—The Northrop loom for drills—Wages at Atlanta—Cheap cotton—Attachment of employés—New Orleans—Louisiana factory laws—Climate of New Orleans—Manufacture of blue denims and cottonades—Liquid fuel—Dyeing lint cotton—Arrangement of carding engines—Piece rates and earnings—Low freight to New York—Workmen's dwellings.

ATLANTA is a city of beautiful situation in the heart of Georgia, of interesting associations both literary and historic, and of extremely modern pretensions. If you take the trolley-car on its outward journey along Peach-tree Avenue, you will see something of the natural charm of the surrounding country, whilst a placard by the wayside telling you that under a particular tree stood the headquarters of General Johnston, afterwards turned over to General Hood, will awaken in your mind memories of the terrible war, which in this part of the United States seems but an affair of yesterday, and will rouse the echoes of that martial chorus which even a world-wide vogue has never vulgarized—surely the most stirring of all marching songs. The *Atlanta Constitution* comes every morning from the press to remind you of Uncle Remus and the little boy who used to steal out nightly to his cabin to be entranced by the old man's tales of the great brotherhood of beasts. Brer B'ar and Brer Wolf you shall look for in vain, and Brer Tarry-pin, I fear, is too highly esteemed by the gourmands of New York and Philadelphia to enjoy much of his former freedom. But Brer Tukkey Buzzud is still to be seen in the air or by the waterside; if you are lucky you may meet Brer Rabbit 'lolloping' down the road in the cool of the evening, as

spruce and as knowing as ever ; and I have no doubt that Brer Fox is somewhere not far away, still studying how to outwit him.

The modern ambition of Atlanta, however, is to be, and to be recognised as, the most up-to-date city in the South. Outward and visible signs of this 'up-to-dateness' are to be found in one or two sky-scrapers, of the real New York pattern, which have lately been built in the business quarter, in the cotton mills established on its borders, and in the general air of bustle which pervades its streets. There is also a new public library—a fine building—upon the front of which one reads, with something of a shock, the following line of great names, all graven in exactly similar lettering upon exactly similar panels of stone, the middle name occupying the place of honour over the doorway : Homer, Virgil, Shakespeare, Carnegie, Dante, Milton, Poe.

And, to name one other curious trait in the character of Atlanta, there had been a miniature race-war in the streets a day or two before my arrival. A party of armed negroes were besieged in a house by a mob of whites, who, after losing several of their number, had burned the defenders out and shot them down as they ran. Atlanta was congratulating itself upon its extreme moderation and self-control, which were proved by the fact that not more than half a score of people had been killed.

There are eight or nine cotton mills in and near Atlanta—about half of them quite new. Labour is scarce, and for positions of responsibility a good many men have been brought from Massachusetts. But some of the mills have been remarkably successful. One company—a family concern with a capital of \$600,000 in stock and \$200,000 in 6 per cent. bonds repayable in three years—started eight years ago by buying 4,000 acres of farm land in the country and building there a mill (driven by water) for the manufacture of sheetings and drills. The company farms the land, growing cotton, corn, potatoes, and market produce, and has built on it a town containing two or three churches, a hotel and livery stable, a store which 'carries' \$30,000 worth of stock and to which the country people from ten or fifteen miles round come for their supplies—and a cemetery. The company owns everything—even the cemetery, I believe.

Farmers come in with waggon-loads of cotton, which they 'trade out' at the store; that is to say, they are given credit at the store for the value of the cotton. The men of this town work in the fields; the women and children in the mills. The enterprise has been a great financial success, for a second and third mill have been built out of the surplus profits after the payment of a steady 10 per cent. dividend upon the stock. This I have on the authority of one of the leading bankers in Atlanta.

One of the largest cotton mills that I visited in Atlanta itself consists of two buildings, one built of brick, the other of wood, containing about 48,000 spindles and 1,400 or 1,500 looms which weave coarse sheetings, shirtings, and drills. Like all the other Atlanta mills, it is driven by steam. The cost of coal, 'a good grade of Tennessee soft coal,' is from 8s. 4d. to 10s. 6d. per short ton; this year, I was told, they could make a contract for their entire supply at 10s. 3d., which they regarded as a 'top price.' The engines of the two mills develop together about 1,700 horse-power, which cost in fuel alone from £2 10s. to £2 12s. per horse-power per annum, the engines running sixty-six hours a week. One of the mills had very old and wasteful engines, and the managers believed that by putting in new engines they would save over £800 a year. Heavy expense had, however, been recently incurred in the renewal of the looms and other machinery. Half of the looms had already been thrown out and new ones substituted, and in a month or two the whole plant would be modern, except the one set of engines and 700 or 800 looms, which had been running for twenty years. The paid-up capital of the company was \$500,000, and the mills were insured with the stock companies, the brick mill at 20 cents per \$100, and the frame mill, a single-story building with side and clerestory lights, at 30 cents.

The drills and sheetings woven here are chiefly for the home market; only about 5,000 of the 25,000 bales made annually are for export. The counts spun are from 13's to 28's, and the spinners, who were running from four to six sides of 112 spindles each, were paid 10 cents per side per day for warp and 11 cents for weft; their weekly wages therefore varied between 10s. and 16s. 6d. There were six

slashing machines, divided into two groups; the first group of four machines slashed the warps for over 800 looms, and was attended by three men, who were paid respectively 7s. 3d., 5s. 2d., and 3s. 2d. a day; the second group of two machines slashed for over 600 looms, and was also attended by three men, at 6s. 3d., 4s. 2d., and 3s. 2d. a day respectively. It was the duty of the slasher-men to carry the beams to the weaver-room door.

The looms vary in width from 32 inches to 44 inches, and between 250 and 300 of them are of the Northrop pattern. Most of the Northrops were weaving a narrow sheeting or shirting, 31 inches wide, having 56 ends and 48 picks to the inch, made with 21's warp and 22's weft, and weighing 5 yards to the pound. For this cloth, which was woven on both kinds of looms, 10 cents per cut of 60 yards were paid to the Northrop weavers and 15½ cents to the ordinary weavers. The Northrop looms at the time of my visit were about to be employed on a 29½-inch sheeting having 42 ends and 44 picks to the inch, made with 28's warp and 13's weft, and weighing 5.4 yards to the pound, for which the weavers were to be paid the same rate as for the 31-inch sheeting, namely 10 cents per 60-yard cut.

About thirty of the Northrop looms were fitted with a 'feeler motion,' which stops the loom before all the weft has run out of the shuttle, and so avoids broken picks; these looms were weaving ordinary three-shaft drills 30 inches wide, having 66 ends and 44 picks to the inch of 12½'s warp and 13½'s weft, woven in 62½-yard cuts. I was told that trouble had been experienced with these looms by reason of the waste on the bobbins, the feeler motion coming into play while there was yet a great deal of weft in the shuttle. This, however, had been overcome by the use of an appliance called a 'bunch builder' on the spinning frames. A further drawback, so far, had been the relatively high proportion of 'seconds' or imperfectly woven drills produced; these seconds had to be sold for from 12½ per cent. to 25 per cent. less than the price for 'perfects.' The speed of the Northrop looms was from 165 to 182 picks a minute, and the weavers (mostly men) ran about sixteen looms each, either on drills or sheetings; a twenty-loom weaver is a very rare exception at this mill. Another point of some impor-

tance is that the Northrop loom weavers have the assistance of children, employed by themselves, in keeping the loom magazines supplied with weft.

Most of the ordinary looms were running no faster than 160 picks a minute, and the weavers had four, six, or eight looms each, the average being six. The production expected from these looms was 54 yards per day of a 36-inch 3-yard sheeting, 48-square, with 13's weft, or 48 yards of a 36-inch 4-yard sheeting, 56 ends and 60 picks per inch, with 21's weft.

The loom-fixers had charge of 100 ordinary looms or seventy Northrop looms each, and were paid, on the English system, in proportion to the work done by the looms. But instead of getting 1s. 6d. or 2s. for every £1 earned by the weavers, they received a fixed price per cut woven—an arrangement which prevented their suffering for a weaver's faulty work. For the 29½-inch sheeting above-mentioned, which was to be woven on the Northrop looms at 10 cents per cut for weaving, the loom-fixers were to receive 1·9 cents per cut. The proportion of the tackler's pay to the weaver's was about the same as this all round.

The mills at Atlanta buy 'good middling' cotton (grown in the district) very nearly one cent per pound less than it costs when landed at Liverpool or Manchester. The difference represents commissions, insurance, and freight, due allowance being made for the customary 6 per cent. tare. They do not, I believe, speculate in 'futures' to any considerable extent.

The workpeople at this particular mill were paid in cash fortnightly, a week's wages being kept in hand. There was a company's store, but I was informed that it was run competitively, and no one need deal there unless he or she pleased. Near the mill were a number of two, three, and four roomed wooden houses owned by the company, and let to the mill hands at 25 cents per room per fortnight. Those of which I obtained a passing glimpse had bare floors and walls, and their outside appearance was dismally bare and dirty. But the secretary of the mill, who had been there for twenty years, assured me that many of the workpeople had been connected with the place as long as himself, and that they were genuinely happy. 'I don't think,' he de-

clared, 'that you could drive some of them away with a Gatling gun.'

A long night-journey across Georgia, Alabama and Mississippi, brought me from Atlanta to New Orleans, where men are more occupied in growing, selling, and shipping cotton than in manufacturing it. But even as far south as New Orleans there are cotton mills, and the State of Louisiana has set an excellent example to its neighbours in the matter of factory legislation. A law passed in 1888 limits the number of hours during which men, women, and children may work in the cotton mills to ten a day, and prohibits altogether the employment of boys under twelve years and of girls under fourteen years of age. When one bears in mind how quickly children grow up in these Southern States—marriages at fifteen are, I am told, quite common—it is evident that the period of childhood spent by anyone in the mills of Louisiana cannot be long. When the ten-hour law was passed, the piece rates for labour in the mills remained unchanged, and there was a general reduction of 10 per cent. in day wages; subsequently, however, there was an advance, so that now the workpeople can earn as much as they did before, if not more, and have more leisure. For them it is no longer 'all bed and work.'

From my own short experience of the New Orleans climate, I should think ten hours' work a day about as much as any white man or woman could perform efficiently for more than a few days together. The city lies low on the alluvial mud of the Mississippi, and the great heat and humidity make its climate peculiarly enervating. All the brick or stone buildings rest upon pile foundations; if you dig down for a few feet anywhere you come to water; in many of the streets and roads there are gutters or ditches, a foot or eighteen inches deep, nearly full of standing water, into which all the house drainage except the sewage goes; and the unoccupied land outside the town is a jungle-swamp, in which palms and other tropical vegetation grow luxuriantly. It is not even possible to bury the dead in the ordinary way; they must be laid in tombs of stone or mounds of earth on the top of the ground. The whole place is an ideal breeding-ground for mosquitoes, and its resources in that way are so inexhaustible that

Major Ross himself, with all his mosquito brigades, would, I think, be baffled by it. Before the end of May the shade temperature at New Orleans had risen to $93\frac{1}{2}^{\circ}$, and during the summer it is, I believe, often 10° or 15° higher.¹

There are two good-sized cotton mills—viz., the M'Innes Mills, making sheetings and drills, and the Lane Mills, making blue denims and cottonades. The Lane Mills, at which I spent an interesting afternoon, stand within a hundred yards or so of the Mississippi, are built of brick, and contain 17,000 spindles and 368 looms. The counts of yarn spun range from 6's to 18's, and the machinery is all driven by steam-power. One of the first things to arrest my attention when I entered the mill yard was an oil-tank car standing on a railway siding; its presence was explained a moment later when I entered the boiler-house and found that liquid fuel was being used in connection with the steam-boilers.

The oil comes by rail from Texas, is stored in underground tanks beneath the yard, and is pumped thence to the furnaces. It had been used at this mill since November, 1901, and as yet there was no sign that the wear and tear of the furnaces had been in any way abnormal or greater than is usual with coal. The mill superintendent very kindly gave me the following account of the comparative cost of burning coal and this fuel oil.

'The coal obtainable at New Orleans,' he said, 'is of two kinds—Alabama coal, costing us \$2.50 per ton delivered here, and Pennsylvania or Virginia coal, costing us \$3.50. The Alabama coal is inferior in quality, but at these prices it is the more economical. The consumption of

¹ In justice to the genial citizens of New Orleans, I quote the following passage from the First Annual Report of the New Orleans Maritime Association, p. 286: 'There was a constant drawback from the unsanitary reputation of the city, which made it necessary, from a financial as well as a hygienic standpoint, to drain, sewer, and pave the city, as well as to provide it with an ample supply of filtered water. It is now a fixed fact, that within the next ten years (from 1901), including the work in drainage and paving already accomplished, the expenditures under the above head will reach between \$20,000,000 and \$30,000,000, and they will make New Orleans not only one of the healthiest, but one of the most attractive, cities in the world.'

coal with our single condensing engine of 480 indicated horse-power was 3 pounds per horse-power per hour. We find that in steam-raising power four barrels of the Texas oil are equivalent to one ton of Alabama coal, and as the oil costs us only 50 cents a barrel delivered in our yard, we make a clear saving of 20 per cent. in our fuel bill, besides the saving of labour necessary to handle and stoke the coal. The mill is insured with the mutual companies at 30 cents per \$100, and, as far as I know, the rate has not been increased in consequence of our using liquid fuel.' For protection against fire and for supplying water to the condenser there are a number of very large water-butts, containing 108,000 gallons of water, which is pumped into them from the river.

Here, as in the Amoskeag Mills at Manchester, New Hampshire, the cotton is dyed as it comes from the bale-openers. First of all it goes into the dyeing vat, then into a centrifugal machine, which throws the water out of it, and thence it is sucked into a dryer containing a long wire apron running over two heated drums. This dryer is enclosed in a wooden casing, and the air within it is heated by steam-pipes and beaten by fans. The dyed and dried cotton is then taken to the lap-scutchers, and so on to the carding and spinning rooms. I noticed eighteen carding engines running on indigo-dyed cotton.

In the card-room there were five sets of ten carding engines each and two sets of nine each, working in the following fashion: The ten (or nine) engines, arranged in a row, all deposit their 'slivers' on to a covered carrier-belt, which, running continuously, delivers them simultaneously through a short drawing-frame into a can. This frame, called a 'railway-head,' consists of four pairs of rollers, the first pair corrugated, and the second, third, and fourth pairs driven at progressive speeds, the last pair, of course, being the fastest. This device obviates the labour of carrying the cans of sliver from the carding engines to the drawing frame. After coming from the railway-heads the slivers are brought together and passed through the ordinary drawing frames (three to one twice over), and thence taken to the slubbing frames in the usual way.

The slubbing is single, and two slubbings go to one

roving. There are no intermediate frames, and only a little of the roving goes to the jack frames, of which there are two. Coarse warp is spun on the ring frames from single roving, but I saw a blue and yellow roving being spun together for weft, also a blue and a red, and a blue and a white. Black and grey rovings were being spun together in the same way for twist. The slubbing, roving, and jack frames were run by men and girls, who were paid 9 cents, 6 cents, or $4\frac{1}{2}$ cents per hank, according to the nature of the work. On 9-cent work about ten hanks can be turned out per day, on 6-cent work about sixteen hanks, and on $4\frac{1}{2}$ -cent work about eighteen hanks. The operatives had one frame (about 120 spindles) apiece. The spinning frames had from 80 to 112 spindles a side, and the spinners, who were paid 10 cents per side per day, were minding from four to eight sides each. The winding frames were of two sizes, and the winders ran either half a fifty-spool side or a whole side of thirty spools. They were paid from 22 cents to 27 cents per 100 spools wound; each spool held $1\frac{1}{4}$ pounds of yarn, and they could wind from 300 to 400 spools a day. I noticed that all the winders were using the Barber knotting machine—an appliance that performs mechanically and rapidly that part of a winder's work which demands the greatest dexterity—and that boys were employed to take away the empty ring-bobbins.

The seven warping mills were run by three warpers and four creelers; the warpers were paid 75 cents a day and the creelers 60 cents, and all worked together, although nominally two of the warpers were in charge of two mills each and the third warper had the other three. The drum speed of these machines was thirty-eight revolutions a minute. There were two five-beam slashing machines, fitted with hot-air chambers instead of the usual cylinders for drying the warps. Corn-starch only was used for sizing, and for dyed warps colour was added to the size in the vats. One slasher-tenter at 6s. 3d. a day and one back-tenter at 4s. 2d. ran the two machines, each of which slashed 10,800 yards of warps in the ten hours. The average count of the warps was 10's.

The weavers were all women, and ran on the average five looms each. The speed of the looms was 175 picks

a minute; they were not automatic, and all the goods woven were of one width—28 inches. The blue denims were made in $57\frac{1}{2}$ -yard cuts of 10's warp and 14's weft, and the weaving price, 19 cents a cut, was the same for four or three shaft work. The weaving price for the cottonades was the same also. These blue denims, a sort of stout butcher-blue fabric, are, I believe, very largely used for labourers' working clothes in America and in our own colonies, and the cottonades, which in appearance (but of course not in feel) resemble ordinary woollen or worsted suitings, are worn by the agricultural class in the West. They are shipped by sea from New Orleans to New York at the low freight of 35 cents per 100 pounds.

Although there is no law in Louisiana to regulate steaming in weaving sheds, steam was not used at the Lane Mills. The necessary degree of moisture was obtained with humidifiers. As at Atlanta and most of the other mill districts which I visited, the workpeople were paid fortnightly, and a week's wages were always kept in hand. The rent of workmen's houses in the neighbourhood of the mill was higher than is usual in the South; a three-roomed house of the ordinary dingy pattern that prevails in the towns costs no less than seven dollars, or 29s. 2d., a month.

CHAPTER XI

Cotton-planting in Louisiana—Planter and tenant farmer—Fertility of the Mississippi Delta—Maize on cotton plantations—Taxation of land and stock—Cost of producing a bale of 'benders' cotton—Finance—Anomalous transport charges—Bad packing—Character of the plantation negro—'Craps'—Negro wages and budgets—Superstition of the negro—Limits to the American cotton supply—An old planter's opinion—Scarcity of labour—Wanted, a machine.

DURING my visit to New Orleans it was my good fortune to meet one of the most experienced cotton planters in America—a man who had been growing cotton in the Mississippi Delta ever since the war. He took considerable pains to give me exact information about the practical management of a plantation, as well as about the economic position of cotton culture, and I am indebted to him for nearly all the facts and figures contained in this chapter.

In this part of Louisiana nine out of ten of the tenant farmers engaged in the growth of cotton are negroes, although taking the South all through fully 35 per cent. of the crop is raised by whites. The planter furnishes the tenant with land and seed (20 acres are the usual area for a man with a family), and also with a house, fuel, water, a mule team, forage, and implements. The tenant has, besides, a garden plot given to him free of charge, and enjoys the privilege of keeping fowls and pigs on the condition that they are securely enclosed. Where these arrangements are made, the landlord or planter takes half the cotton crop and the tenant the other half.

A mule team, I should explain, is a variable quantity. It consists of two mules for breaking and preparing the land ;

after that has been done it consists of one mule for cultivating the crop. The Louisiana mule is a magnificent animal, standing from 15 to 16 hands high, as strong as a big horse, and far more robust in its constitution. Some tenant farmers are able to provide their own mule teams, forage, and implements, and in these cases the landlord's share of the crop is only one-fourth.

About 16 of the 20 acres farmed by the tenant will be planted with cotton, and the remaining 4 acres with maize. There is no regular rotation of crops, but when, after long cultivation, a cotton-field begins to show signs of exhaustion, it is used for the production of maize and cow-feeds, and one year of this change restores its fertility. On the uplands the cotton-fields are manured annually with from 300 to 500 pounds of concentrated fertilizer per acre, but of these none are used in the Mississippi Delta. The crops of cotton vary from 225 to 400 pounds an acre, and my friend assured me that there was not a plantation in the whole of the delta which could produce an average of a bale an acre. The delta cotton has a heavy wiry staple, usually from $1\frac{1}{8}$ inches to $1\frac{3}{16}$ inches in length, and derives its distinguishing name, 'benders,' from the fact that it is grown in the bends of the Mississippi River. The planters generally get for it from $\frac{1}{4}$ cent to $\frac{3}{8}$ cent more than the New Orleans quotation for middling upland cotton, but the price increases rapidly with the length of the staple beyond $1\frac{3}{16}$ inches.

The thrifty cotton-planter produces on his own plantation all the maize that he needs for working it, and for this purpose 20 per cent. of the land is generally ample in the delta, and from 25 per cent. to 30 per cent. in the uplands. In the delta there is never any inducement to grow maize for the market rather than cotton; the necessity for growing maize at all arises from the fact that shelled Western maize is not good for mules. Unless it is crushed beforehand, they neglect to masticate it, whereas home-grown corn, fed to them in the ear, they masticate thoroughly.

Cotton land in the delta is assessed for taxation at about \$15 an acre, and the State tax is 2 per cent. There is a county tax of 1 per cent., and a special tax of \$1 per bale on the cotton produced, or 5 cents per acre on timber lands,

is imposed for the maintenance of the levees or dykes along the river-banks. Horses and mules (valued at \$70 each all round) and cattle (valued at \$10 each) are taxed at the rate of 2 per cent. by the State and 1 per cent. by the county, but two head of cattle are allowed to every tenant free of taxation. Waggon and other vehicles are also taxed.

Here is an account of the actual cost of producing a 500-pound bale of cotton (benders) from 2 acres of land. The rental of the estate (285 acres) upon which it was grown is \$3 per acre:

Cleaning land of last year's stalks and rubbish, one day's work	\$.75
Preparatory ploughing, two and a half days' work at 75 cents	1.88
Seed, 120 pounds at \$9 per ton	.54
Labour for planting, three-quarters of a day at 75 cents	.57
Cultivation : ploughing and hoeing 12 days during season, at 75 cents	9.00
Proportion of year's feed of mule (9 bushels of corn and 1½ tons of hay)	5.38
Proportion of depreciation of mule (working life five and a half years, value \$125)	3.05
Proportion of wear and repair of implements	1.98
Picking 1,550 pounds of seed cotton, at 50 cents per 100 pounds	7.75
Ginning and delivery to shipping point, at 35 cents per 100 pounds	1.75
Actual cost to produce exclusive of rent (if a tenant) or of interest on value of land, taxes, insurance, repairs to property, and other expenses incidental to the ownership of land	32.65
Deduct value of 1,120 pounds of seed, at \$9 per ton	4.59
Net cost	\$28.06

\$28.06 for 500 pounds is equal to 5.61 cents per pound, or 2.8d.

It should be noted that the basis of this calculation (250 pounds of lint cotton per acre) is a larger production than can be obtained, except in specially fertile districts, and is considerably more than the average production per acre in the United States, according to the most trustworthy statistics of acreage and production. Further, no fertilizers

are included amongst the items of expense. Whilst the other expenses are practically the same in less-favoured parts of the cotton belt, the cost of fertilizers is considerable, and even with their aid the yield here calculated upon is not obtained. Consequently the cost of producing cotton in the uplands, where fertilizers are used, is greater than is shown above.

Most of the large planters now finance themselves until the beginning of May or June, when they borrow on a mortgage covering the land only—not the crop. Formerly advances on the crop were made by the cotton factors at the seaports, to whom the crop was forwarded for sale after it had been harvested and ginned; but the trade has been greatly changed, and the factorage business pure and simple reduced to comparatively meagre dimensions by the growth of direct purchases by consumers from producers in the interior towns. Loans for capital expenditure are obtained from investment companies (one or two of the most important of which are British) on different plans. Sometimes all the interest and a percentage of the principal has to be paid annually until the loan is extinguished; sometimes interest alone is payable for an agreed term of years, and then the principal is repaid by annual instalments. The rate of interest on such loans is usually 8 per cent., and there is an additional commission of $2\frac{1}{2}$ per cent. or 5 per cent. to the agent who negotiates the loan. Loans for 'making' the crop—that is, cultivating and harvesting it—are usually obtained from banks in the neighbouring towns, on the security of the land if necessary. The rates vary, but sometimes a bank will charge 5 per cent. for five months. In Georgia there is a usury law which makes any rate of interest over 7 per cent. per annum illegal without a written and signed contract.

The cost of shipping cotton from the plantations to New Orleans was a sore point with my friend the planter. He instanced one plantation, 365 miles from New Orleans, which could send its cotton by rail to the city for \$1.15 per bale, or, say, \$4.60 per ton, whilst the rate from another plantation, fifty-three miles nearer to New Orleans, was \$1.50 per bale, or \$6 a ton. The reason was that the one plantation was by the riverside and enjoyed the benefits of

steamboat competition, whilst the other was wholly dependent on the railroad.

I asked him to tell me why American cotton sent to England was so badly baled in comparison with Egyptian cotton, and his answer was that the badly baled cotton generally came from the public ginner. The public ginner, it seems, gins and bales the cotton at an inclusive price (say 50 cents per 100 pounds), furnishing the bagging and ties; and naturally he furnishes a cheaper and lighter bagging than the material ($2\frac{1}{4}$ pounds to the yard) generally used by the larger planters.

The negro tenant farmer, according to my planter friend, is, as a rule, a somewhat thriftless but quite honest person. He gets his supplies from the planter in advance, and when the crop is ginned he pays up. His readiness to buy on credit has to be discouraged in order that something may remain for him at the end of his season's work. Even then he does not always make a wise use of it. One negro with a wife and five or six children drew \$300 just before the last Christmas holidays, and on February 1 was owing the planter money on the new crop. The besetting weakness of the negro is gambling, and his favourite game is 'craps,' played with dice. At the crap-table he will often lose or win at a sitting a sum equal to the profits of his labour for a whole year.

The wages of a negro labourer on the plantations are 75 cents a day and a house; no plantation negro pays rent. Ostlers and male domestic servants get from \$12 to \$15 a month—always with board and lodging. Here is the weekly housekeeping budget of a family of five plantation negroes—a father, mother, and three well-grown children :

				\$
10 pounds of bacon, at $12\frac{1}{2}$ cents	...	...	...	1.25
12 " flour...	...	...	...	.40
12 " Indian meal	...	...	...	.30
1 quart of molasses	...	...	...	.12
1 pound of coffee	...	...	...	.12
2 pounds of sugar	...	...	...	.14
Salt, etc. ...	...	...	...	.10
				<hr/>
				\$2.43

This is equal to 10s. 1½d., and I am told that it is a 'liberal allowance.' Garden stuff, milk, eggs, and fuel are obtained without cost.

My friend the planter held a curious theory about negroes, in support of which he told me the following anecdote: A negro on his own plantation—an old and faithful servant of excellent character—said to him the other day:

'Boss, when I gits old, so's I can't work, I'se gwine to do sumthin' to git hung.'

'Why?' asked the master, astonished.

'Well, boss,' replied the negro, 'you never heard of a man that wuz hung that didn't know he had the forgiveness of God an' go right up to heaven. But an ox-teamster, like me, if he dies sudden he goes to hell straight, 'cause no man can drive an ox-team without cussin'. Now, if you git hung, you's gwine to have a month to prepare, and you don't git taken unawares.'

Some Southerners profess to believe that negroes actually commit capital crimes simply to insure for themselves due notice of their end; but I suspect that the theory is cherished mainly as a specious justification of lynching. The imperfection of the poorer negroes' religious education in this particular is shown, however, by the fact that if one of them is killed suddenly—by lightning, for instance—the others will often say: 'That nigger has sho'ly been a sinful man!'

In view of the rapid increase in the world's spinning and manufacturing plants, particularly in the cotton mills of the Southern States, I asked my friend whether he thought that the American cotton supply could be materially augmented without an advance in price, and if so, what were the limitations of the possible increase.

In reply, he expressed the opinion that, on the present basis of average values, the limits of cotton production remunerative to the land-owner had already been nearly reached. It was rather because of the scarcity of labour than for want of suitable land. The black population was increasing, but not so rapidly as formerly, and both blacks and whites were being drawn away from the fields to other employment. In the Mississippi Delta alone there were now 3,500 men employed in the lumber and timber industries

where ten years ago there were almost none, and it was the same all over the South. The cotton mills themselves had robbed the cotton fields. With 'middling' cotton selling at from $8\frac{1}{2}$ to 9 cents per pound, he thought that from 25 to $33\frac{1}{3}$ per cent. more land might be brought within the economic margin of cultivation; but it would take time, for the negro dislikes the arduous toil of clearing land. My friend himself had offered \$10 an acre in vain for work of this character. Moreover, such an increase in the area of cultivation was, he said, hardly possible now, because the negroes can already cultivate more cotton than they can harvest. Cotton-harvesting machinery would be of incalculable value, but an efficient machine for picking cotton has yet to be invented. It is a difficult problem for the inventor, because picking cotton is something like gathering raspberries, and even American genius has boggled at it. There have been many fruitless efforts, but I am assured that there is not to-day in the United States a single machine with which any planter would even attempt to pick cotton.

CHAPTER XII

American openness in business—Costs of spinning and weaving in Massachusetts—Cost of manufacturing print-cloth at Fall River—The Fall River Selling Combine—Cost of making sheetings, drills, and jeans in New England—Cost of spinning 36's weft at Fall River—Comparative cost of shipping cotton from the South to New England and to Great Britain—A lesson in incredulity—Costs of manufacture in the South—In North Carolina, South Carolina, Georgia—Financial position of the Southern mills—Scarcity of working capital—Extravagant commissions—The proposed 'combine'—Growth of the Southern industry—Its menace to England.

AMERICAN manufacturers are famous for the liberality with which they admit visitors, and even competitors, into their mills. With few exceptions, they believe that this is a profitable as well as a graceful policy, and I have often heard them say that the man who keeps the door of his mill jealously locked shuts in antiquated machinery and methods and shuts out progressive ideas. One superintendent of a very large mill said to me: 'Anybody is at liberty to go into my mill and see all that there is to be seen. The only condition I make is that I shall go with him, and if he learns more from me than I learn from him—well, he's welcome to it.' No doubt this readiness of Americans to show their mills to foreigners is due in part to their knowledge that their home trade, or the greater bulk of it, is secured by the tariff from foreign competition; but that explanation does not cover the whole ground, for American manufacturers do not exclude one another from their mills, nor have those manufacturers whose goods are destined for neutral foreign markets shown themselves less

ready than the others to open their doors to visitors from England.

In the preceding chapters I have, thanks to this policy of the open door, been able to give the reader actual facts and figures relating to a number of representative American cotton mills at the present day—particulars of wages, hours of labour, machinery, distribution of labour over machinery, cost of plant, power, insurance, local taxation, transport, quality of raw material used, and general results. Here, with a little more diffidence, I propose to submit to him certain information respecting the costs of production which has been furnished to me by a number of American manufacturers. I do so with diffidence, because the reader may, not unnaturally, be sceptical as to the accuracy of the figures. He may find it hard to believe that prudent business men would be willing to say exactly what their costs of production were. Some of the mill treasurers and superintendents to whom I am indebted for these figures requested that the names of their mills might not be disclosed; others made no such request, but as their omission to do so may have been inadvertent, I shall indicate each of the mills by merely a geographical designation. Without further preface, I submit the figures for what they may be worth.

At a large inland mill about thirty miles from Boston, equipped with ring-spindles, a few Northrop looms, and a large number of common looms, of which one weaver minds on an average eight, the cost of spinning 28's twist during the first three months of 1902 were :

				Cents per pound.
Picking and carding	...	...	...	1
Spinning...	...	...	...	1'04
Winding...	...	...	...	'44
Warping...	...	...	...	'16
General expenses...	...	...	...	2'00
				<hr/>
Total	...	...	...	4'64

Taking cotton on the basis of 10 cents per pound, the actual cost of the cotton (cleaned) per pound of 28's twist spun was 11·7 cents. The total cost of the yarn was therefore 16·34 cents per pound, less the difference (if any) between 10 cents

and the average price at which the cotton was actually bought. At the same mills the costs of producing print-cloth, 7·15 yards to the pound, 27 inches wide, 28's twist and 36's weft, were given as follows :

				Cents per pound.
Loss of cotton in spinning	...	...	...	1'700
Picking ...	...	...	...	'130
Carding	...	...	...	'811
Spinning	...	...	...	1'340
Winding and warping	...	...	...	'345
Dressing	...	...	...	'141
Drawing-in	...	...	...	'140
Cloth-room	...	...	...	'083
Weaving	...	...	...	3'454
General expenses	...	...	...	3'025
Total				11'169

To this must be added the price per pound paid for the raw cotton. The superintendent told me that '385 of a cent per pound would cover interest and capital charges, and that '33 of a cent per pound profit would pay a dividend of 6 per cent. upon the company's incorporated stock. Taking cotton at 10 cents per pound (the basis upon which they 'figure'), the net cost of this cloth works out at 2'96 cents per yard.

Another mill superintendent said, without referring to books, that in 1898 the cost of spinning and manufacturing this same standard print-cloth at Fall River was about 9 cents per pound. The actual cost of cotton was 9 cents, and the total cost of the cloth was therefore 18 cents. At that time the Fall River Sales Committee was selling print-cloth at 2 cents per yard, which was equal to 14'3 cents per pound, and the manufacturers were therefore losing heavily. The Selling Committee had made the mistake of holding cloth too long on a falling market, and it was this disastrous result that led, I believe, to the collapse of the Selling Combine.

The next figures relate to a large mill in New England, where sheetings, drills, and jeans are made, largely for the China market. The mill is driven principally by water-power. There are no automatic looms, and nearly, but not quite, all of the spinning is done on ring frames. The counts spun vary from 5's to 39's, the average being 19'43.

The books here showed an average all-round cost from cotton to cloth (unfinished) of $\cdot 3$ of a cent per hank, or 5·829 cents per pound of cloth. In two periods covered by the accounts the costs had been respectively $\cdot 2962$ and $\cdot 304$ of a cent per hank, or 5·754 and 5·907 cents per pound. In the former case, when the total cost had been $\cdot 2962$ of a cent per hank, the total cost of labour from cotton to cloth had been $\cdot 2$ of a cent per hank, and general expenses $\cdot 0962$ of a cent; or, expressed per pound instead of per hank, labour had cost 3·886 cents, and general expenses had been 1·868. The costs of the office at Boston were, said the superintendent, about $2\frac{1}{2}$ per cent. on the labour cost at the mill, and in giving the office a cost price from which to sell it was his custom to add 10 per cent. to the figures given above. For Fall River print-cloth counts $\cdot 3$ of a cent per hank would be about 9·6 cents per pound.

At another mill, where 39-inch sheetings are woven (partly on Harriman looms), with 72 ends and 80 picks to the inch, 28's ring twist and 37's mule weft, I obtained the following particulars of costs: The cost of spinning the 28's twist and the 37's weft together (including slashing) is here $\cdot 15$ of a cent per hank, or, say, 4·87 cents per pound, taking $32\frac{1}{2}$'s as the average counts. The expenses of weaving are reckoned at \$1 (4s. 2d.) per loom per week, and the weaving wage at \$1.20 (5s.) per loom per week, for a production of 162 yards, or 40 pounds. This works out to a total weaving cost (including labour) of 5·5 cents per pound; adding the spinning and slashing costs (4·87 cents per pound) we get a total cost from cotton to cloth of 10·37 cents per pound, or about 2·59 cents per yard of 39-inch sheeting, exclusive of the cost of cotton. During the past year, the superintendent said, the actual cost was $\cdot 4$ of a cent per pound less than this, or, say, 9·97 cents per pound, and this figure, he said, included provision for interest and depreciation. The mill is driven very cheaply by water-power alone.

I may end what I have to say with regard to New England by quoting some figures given to me at Fall River by the technical representative of one of the foremost textile machinery makers in America. He said that the average cost of producing 36's weft before the recent advance in wages was from 1·15 to 1·25 cents per pound, and the cost of

carding from .85 to .9 of a cent. The total labour cost was therefore from 2 to 2.15 cents per pound, or, allowing for the advance in wages, 2.20 to 2.25 cents per pound. The cost of 28's ring twist was, he said, .85 of a cent for carding, and about the same for spinning, or, say, 1.70 cents altogether; mule twist, according to this informant, would cost 20 per cent. more. One mill, he said, where they had long mules with 2,200 spindles, could spin 33 per cent. cheaper on ring frames.

New England, so far as I can gather, has no advantage, or very little, over Lancashire in the cost of bringing raw cotton from the South. I have the authority of Mr. S. T. Hubbard, President of the New York Cotton Exchange, for the following facts: Cotton is now being carried to Europe for less money than to New England. The rate from New Orleans to the Manchester docks on March 8, 1902, was 32 cents, while the rate to Fall River was 38 cents per 100 pounds. Cotton bound to New York and consigned to New England points often pays a higher freight rate than cotton in the same steamer bound for Liverpool or Bremen. Cotton shipped to Liverpool from Newport, Arkansas, pays a freight rate of 62 cents per 100 pounds, whilst the rate to Lowell, Massachusetts, is 75 cents. The railroad companies exercise the right of 'routing' or forwarding cotton to New England by such roads as they (not the consignees) may choose. 'In short,' said Mr. Hubbard, 'the cotton which has gone to Europe this season has been handed to spinners abroad at a lower rate of freight than cotton shipped to spinners in New England.' It is necessary to bear in mind, however, that ocean freights had been exceptionally low, and that the cost of conveying cotton from the docks at Liverpool, or even at Manchester, to the mill, would, when added to the ocean freight, remove much or all of the apparent difference in favour of Lancashire.

Perhaps it would be well to preface my account of what was told to me about costs of production in the South by a short story which, although true as stories go, has in this connection some of the significance of a parable. Or, to put it in another way, it is offered as a grain of salt with which some of the things that are to follow may be judiciously seasoned. The story is this:

A Canadian manufacturer, visiting an American mill, was taken by the superintendent to see a certain machine at work, and inquired what weekly production was obtained from it. The American, with a fine air of candour, named a quantity which, although it seemed sufficiently precise to be accurate, the Canadian knew from his own experience to be an exaggeration. But he did not betray the slightest surprise. 'Ah,' said he, 'I thought it would be about that, or perhaps a shade more. We have the same machine at our place, and we get off'—here he named a figure slightly in excess of the American's. There the matter dropped. But in the evening the departmental manager of the mill came to see the Canadian at his hotel, and said.

'Look here, what have you been telling our boss about that new machine? He has been complaining to me that we are not getting nearly enough work out of it.'

'I think,' said the Canadian, 'that you had better ask your boss what he has been telling me.'

Visitors to America are seldom heard to complain, like the Queen of Sheba, that the half has not been told them. Some Americans, as a friend of mine put it, have a way of telling rather more than the half.

The actual cost of producing coarse cotton goods in the South is undoubtedly less than in New England. The cotton is obtained more cheaply by from $\frac{1}{2}$ cent to 1 cent a pound; the Southern mills, being newer and having less skilled labour, have been equipped to a greater extent with labour-saving machinery, which in some degree neutralizes the difference between skilled and unskilled labour, and enables work to be continued daily for very long hours without so serious a loss of efficiency as would otherwise be inevitable; for the automatic machine never tires, and, as it stops of itself when anything goes amiss, the vigilance of the minder is not so severely taxed. Another point is that the Southern mills have specialized in their work more than the Northern. A typical Southern mill makes far fewer kinds of cloth and spins far fewer sizes of yarn than a typical New England or Lancashire mill. This is a form of 'standardization'—a 'blessed word' which spells economy. On the other hand, the average size of a mill in the South is less than in the North, and this

means that efficient management is relatively more costly; and further, as I shall show presently, the cost of financing a mill business in the South is in many cases a very heavy burden. As to the cheapness of labour in the South, I hesitate to draw a general conclusion from my own limited observations. Wages are unquestionably very much lower, and the 'truck system' is almost universal, but whether the cost per unit of efficiency is greater in the South or in the North it is hard to say. But for the automatic loom the North would, I think, have the advantage. Perhaps the truth is that in some parts of the South where the industry has been longest established, and a generation has been trained to the work, Southern labour is actually as well as nominally cheaper than the Northern; whilst in other districts, where many mills have sprung up all at once amongst a sparse rural population, wholly untrained, the Southern labour at present procurable is really dearer than the Northern. In any case I do not think that really cheaper labour can be counted on as a permanent advantage for the Southern cotton mills.¹

¹ 'In the present agitation against child labour in the South, the American Federation of Labour has played a leading part, especially in Alabama and Georgia. The Bill which the Federation has fathered in the various Legislatures seems reasonable enough. No child under twelve is to be admitted into any factory (unless the sole support of a widowed or invalided parent, and then not under ten); night work is to be forbidden, and hours limited to sixty a week, for children under sixteen; all must be able to read and write, and three months' schooling a year is required for those under fourteen. The war has been carried into the enemy's country by a spirited appeal to the stockholders in the North to "do as they would be done by," an appeal which drew a characteristic telegram from Mr. Seth Low to the President of the Alabama Committee for the Abolition of Child Labour. Mr. Low confessed to an interest in the Massachusetts Mills, Georgia, but favours restrictive legislation in that State. If other shareholders showed as much conscience, the battle would speedily be won. Unfortunately, they do not. Mr. J. Howard Nichols, Treasurer of the Dwight Company Mills at Alabama City, opposes the proposed legislation, although of opinion that "child labour not only is wrong from a humanitarian standpoint, but entails an absolute loss to the mill." Much indignation has been aroused by pitiful details which are well vouched for: "Children six and seven years of

At a new mill containing 800 Northrop looms, situated in the country near Charlotte, North Carolina, I was told that the average cost of producing China drills and sheetings from the raw cotton was only 3 cents a pound, the counts of yarn used being from 13½'s to 14's. Nothing was made but these drills and sheetings; the mill was driven very cheaply by water, and the piece rate for weaving, 13 cents per cut of 120 yards, was the lowest I had ever heard of. The total labour cost, the superintendent said, was 1·5 cents per pound, and all the other expenses came to 1·5 cents. Frankly, I cannot believe that these figures cover everything. In New England I had been told that drills and sheetings could be produced at an inclusive cost of '3 cent per hank, which would be 4 cents per pound for these counts, 2·7 cents being for labour and 1·3 cents for general expenses. But nowhere else have I met with even a claim to so economical a working, although it is fair to say that part at least of the difference—1·3 cents per pound—between the labour cost at these two mills may be accounted for by the fact that the New England mill has no automatic looms, pays nearly four times as much per cut for weaving, and makes a much greater variety of goods.

At a smaller and older mill, driven by steam, in South Carolina, the total labour cost of producing drills and sheetings, the average counts being about the same as at the North Carolina mill just quoted, was given to me

age working for twelve hours a day, with only half an hour for rest and refreshment." "Little children called on to endure the strain of all-night work, and kept awake by the vigilant superintendent with cold water dashed in their faces." The delegate of the Federation reported that long hours—eleven and three-quarters per day—prevailed in every one of twenty-four mills visited in Alabama. Very young children are commonly employed, although not always on the pay-roll. She saw "a boy under four pulling the yarn off bobbins to make bands." Other stories, perhaps not so authentic, contain an element of grim humour. The mill managers of Dallas, Texas, boast of their humanity to the children because "they don't take 'em before they can walk." A Sunday-school superintendent in a mill village told the children that "God had put it into the hearts of good men to open a cotton mill that they might earn money, so as to be able to put a nickel in the missionary-box."—*Manchester Guardian*, May 8, 1902.

roughly as between 3 and 4 cents a pound—nearer 3 than 4 cents. This included the cost of all outside labour, but did not include general expenses, about which my informant had no exact knowledge. The goods were woven on ordinary looms, and if these figures are to be trusted, as I fully believe they are, the labour cost was probably at least $\frac{1}{2}$ cent a pound more than at the New England mill. I gathered from other sources that this little South Carolina mill was not prospering.

Coming to rather finer counts—17's to 18's—I was informed by a trustworthy authority that at a certain large mill in Georgia, driven by steam-power and equipped with both Northrop and ordinary looms in the proportion of about one to four, the total labour cost of producing drills and sheetings in the four departments (picking, carding, spinning, and weaving) was just over 2 cents per pound. With the cost of outside labour added it came to $2\frac{1}{4}$ cents per pound, and general expenses at the mill amounted to $1\frac{3}{4}$ cents, bringing up the total to 4 cents a pound. Depreciation and maintenance charges came to $\frac{1}{2}$ cent per pound. The cost of producing similar cloth at the New England mill was 5.25 cents per pound for everything. At another Georgia mill with nearly a thousand looms, mostly of the ordinary pattern, but some of the Harriman automatic type, the average counts were 18's to 19's, and the actual labour cost of picking, carding, spinning, and weaving drills and sheetings was said to be just about 2 cents per pound. This figure confirms the last; but compare it with the details of the labour cost for similar goods, average counts 19 $\frac{1}{2}$'s, in New England:

Bale to roving	...	...	...	'62 cent per pound.
Roving to yarn, average (warp	...	...	...	'56 cent,
weft '78 cent)	...	...	...	'67 " "
Winding and warping	...	...	...	'46 " "
Slashing	...	...	...	'41 " "
Weaving	...	...	...	2'24 cents "
Total	...	...	...	4'40 " "

The Georgia mill is driven cheaply by water-power, has a good name as an employer of labour, has been established

for many years, and is in a district containing many competent mill hands.

In still finer counts, ranging from 29's to 40's and averaging 35's, a new mill in South Carolina, driven by steam and electricity and containing between 2,000 and 3,000 Northrop looms, claimed to be producing sheetings at a cost of 3 cents per pound for all labour, and a further 3 cents for all other expenses, making 6 cents in all. This mill was using 'strict middling' New Orleans cotton at 9.75 cents a pound, and, whatever may be achieved when it has been running longer and has obtained a better supply of labour, I am disposed to question the accuracy of the figures at present. The cost of producing similar sheetings at a mill near Portland, which is driven by water and has excellent labour at wages decidedly low for New England, is 9.9 cents per pound, including interest and depreciation, for average counts of 32½'s; and the cost of producing print-cloth in New England with 28's warp and 36's weft is from 9 to 9½ cents per pound, the general expenses being no higher than here. I believe, however, that some Southern mills are producing print-cloth of this description at a cost of 6 cents per pound.

One of the most candid and well-informed of the Southern manufacturers with whom I discussed this question told me that, as far as coarse sheetings and drills went, 4 cents per pound would be a good average for all labour costs and general mill expenses in the South. That was the cost to himself, and while he knew that a few mills could work a little more cheaply than his, he would disbelieve any such figure as 3 cents. 'The fact is,' he said, 'that most of the mill men in the South don't know enough of accountancy to keep a proper cost account, and omit many things that ought to be included.' This was comforting, as far as it went.

With regard to the general financial position of the mills in the South, the gravest misgivings have more than once been expressed to me by Southern authorities. A man holding an important position in public life in one of the cities of Georgia—an apparently prosperous mill district—declared that many of the mills had been built on 'wind.'

'Of course,' said my friend, 'the thing can only be done

during a boom; when we get into the trough of the wave, as we shall in a few years at most, there will be serious trouble. A mill built in this fashion, without working capital, is, moreover, badly handicapped in trading, and the cost of management is often very extravagant. A mill with a plant standing at \$1,000,000 will have a president (general business manager) at a salary of \$7,000 a year, a superintendent who, if he is a really first-class man, may get \$10,000, and a book-keeper at \$2,500. If they have sufficient working capital to finance themselves, they will employ a treasurer to sell their goods, but only one of our local mills is strong enough to do that. In the absence of working capital they have to go to the North (for the Southern banks have little money) for all the money they need, and they generally go to some wealthy commission agent in New York, with whom they make a contract of this kind: The commission agent has the selling of the entire product of the mill at a commission of 4 per cent. on the gross sales, he guaranteeing all accounts, and he undertakes further to find all the money they may need for working the business at a "flat" rate of interest, generally 6 per cent. Now, a mill with a capital of \$1,000,000 will produce goods to the value of \$1,250,000 to \$1,500,000 a year, and 4 per cent. on that is from \$50,000 to \$60,000—equal to 5 or 6 per cent. on the capital for selling alone. Such mills are bound sooner or later to fall into the clutches of the commission houses. The mills in this city can't compete with the country mills in South Carolina, where wages are 10 per cent. lower.'

At another Southern city I was told by a banker that many of the cotton mills, especially the smaller mills, were undoubtedly very deeply involved with the commission houses, who received, he said, 5 per cent. commission for selling and 3 per cent. trade discount. The mills ship their cloth weekly to these agents, and draw upon them for 90 per cent. of the value. The agents sell 'to whom, when, and at what price they like, and account to the mills as they see fit. They are absolutely uncontrolled.'

The Southern manufacturers can carry their raw cotton at a cost of less than 6 per cent.—sometimes as low as 5 per cent. The financial machinery by which this is done is

rather interesting. There is a storage company which, when a manufacturer has laid in a stock of cotton, sends to the mill, inspects the cotton, and swears in one of the employés of the mill as its agent, to be responsible that none of the cotton shall be removed from the store until paid for. The cotton being thus warehoused under bond, in the custody of a man who is for the time being a servant of the storage company, that company issues a guarantee certificate setting forth the quantity, quality, marks, and so forth, of the cotton, and undertaking 'to hold the said property in store and to deliver the same upon the return of this receipt, properly endorsed, and upon payment of all charges thereon.' The storage receipts of this company are in turn registered with a New York surety company, which guarantees that the storage company 'shall honestly and faithfully keep and perform all of its obligations under the terms of this receipt as to the quantity, quality, care, and delivery of the property.' It is claimed that the responsibility behind these receipts exceeds \$5,000,000. However that may be, my friend the banker regarded them as a perfectly satisfactory security for loans.

In New York I met a man who knew something of the inner working of the movement then on foot for a great Southern cotton-mill combine, and he confirmed what I had been told about the financial difficulties of a considerable proportion of the Southern mills.

In connection with the proposed 'combine' or 'merger,' a New York financier had recently held two conferences with Southern mill men, one at Greensborough and the other at Atlanta, and it was believed that he had secured promises from fifty or sixty mills to join in forming a new company with a capital of \$60,000,000. Most of the mills were in North and South Carolina and Georgia. The new company was to be incorporated under the laws of New Jersey during the autumn of 1902, and its successful flotation was thought to be assured. The effect, it was said, would be the immediate investment of 8,000,000 of New York capital in the Southern cotton industry, and the maintenance of a fixed price for the products of the mills.

Nearly all the mills, said my informant, were in the hands of the New York commission houses, and not a few of the

New England mills also. The same commission house sometimes represented three or four mills, and cut one against another. The movement in favour of combination was due to a general desire to 'put the finances of the mills on a sounder basis before the boom should give way to the inevitable slump.'

But, however undesirable as an investment the Southern cotton mills as a class may be at the inflated values of 1902, it would, I feel sure, be a grave mistake to assume that the industry will not survive seasons of adversity. Companies may be reconstructed and mills may change hands at a great loss to their present owners, but under the changed conditions they will be even more formidable competitors with the mills of New England and of Lancashire than they are to-day.

At the beginning of this year (1902) the Southern States contained something like 6,250,000 spindles and 130,000 looms. In 1880 there were 180 factories, in 1890 there were 264, in 1900 the total was 663, and the increase in the number of spindles and looms had been much greater in proportion. In 1901 113 new mills were started, and it is estimated that 135 more will have been completed by the end of 1902. The consumption of cotton in the South has increased fourfold and more since 1887, and is now 40 per cent. or thereabouts of the whole consumption of the United States mills.

The significance of figures like these can hardly be exaggerated, and although I have seen nothing to convince me that the South is likely to challenge the supremacy of Lancashire in the manufacture of the finer yarns and fabrics, it is certain that, if we are to retain any considerable share of our trade in heavy cotton goods, we must avail ourselves of every possible economy in the buying and transportation of our raw material, and above all we must neglect no method of cheapening the processes of manufacture which mechanical science, whether discovered and applied by English or American genius, may place at our command.

CHAPTER XIII

Calico printing in the United States—Economical production—How it is achieved—Favourable conditions of the home markets—Printworks at Passaic—Speed and output of machines—High wages—Printworks at Lowell—The production of 'indigos' at Fall River—New printworks at Manchester, New Hampshire—Cost and capacity—Finer work and smaller quantities—Faults in American cloth—Comparison with England—Competition in Canadian markets—Opening for English prints in America.

THE art of calico printing has not been carried in the United States to a greater degree of perfection than in the United Kingdom or the Continent of Europe, nor has the science, as a branch of applied chemistry, been developed further. There are not more than two or three establishments in the United States which produce printed fabrics comparable in beauty and delicacy of finish with the best English and Continental work, and American printers are still to a great extent dependent on Europe for their designs, for highly-trained chemists and managers, and for pigments and 'drugs.' But America has led the way in devising economical methods of production, stimulated by the high wages which have had to be paid to attract skilled superintendents and workmen, and assisted by the conditions of the market. The result, in brief, is that, whereas the average weekly production of a printing machine in the United Kingdom is 20,000 yards, it is something like 75,000 yards in the United States. And there is little or no difference in the machines.

The explanation of this contrast is mainly that American printers produce fewer patterns and far more pieces of each pattern. A letterpress printer who sets up and prints a

hundred different books in one year cannot, with the same establishment, produce nearly as many volumes as a printer who has only twenty books to set up and print; and it is much the same with the calico printer. When once the type has been set up, or the rollers engraved and placed in the machine, a great part of the work is done, and until the type wears out or the pattern wears off the rollers printing may go on at a cost per unit of production which remains constant so far as the actual printing is concerned, but steadily diminishes when the preliminary expenses—the cost of preparing the rollers or setting up the type—are taken into account. But just as the letterpress printer's production is limited by the sale for the particular book which he happens to be printing, so the calico printer's production of any one pattern is limited by the demand for it; it is merely waste of material and labour to go on printing a book or a cretonne, even though every volume or piece costs less than its predecessor, after the demand for it has been satisfied.

The American calico printer is able to run his machines longer on one pattern than ours can because the American market for prints can absorb larger quantities of one pattern than our markets. In the first place, the American prints almost exclusively for his home market—the bulk of what he sells abroad is the surplus of his home production—whereas we print for the whole world, and every one of our markets has its own idiosyncrasies of taste. Then, the American home market is, for special reasons, exacting in quantity rather than in variety. Nowhere else is there such a market for prints. There is a population of 75,000,000, who have probably more money to spend than any other people in the world, and who spend a larger proportion of it on dress. It is the ambition of all classes in America to be well dressed; the rich New York or Boston woman who spends hundreds of dollars every year on Paris finery cherishes it no more dearly than the factory girl at Fall River or the Southern negress; and American men vie with one another in giving their womenkind the means of adorning themselves handsomely. Then, the climate—dry, sunny, with a long, hot summer, and an atmosphere, except in a few of the towns, remarkably clean and clear—makes printed calicoes a favourite and most suitable dress material.

Here you have the explanation for the demand for quantity. When you consider further that this population is spread over an area of 3,500,000 square miles, making the United States still one of the most sparsely populated of civilized countries, the sufficiency of a comparatively few patterns is readily understood. A woman is not likely to be rubbing shoulders continually with other women in dresses of the same pattern as her own. There are, of course, two distinct kinds of calico printing in America—that which is done for the million, and that which is done for the select few, and most of what I have said applies only to the first class.

But the first class is by far the more important, and I propose to give a short account of two typical establishments devoted mainly to this kind of printing, and of one devoted to the other kind.

At Passaic, a small town in New Jersey, I visited a print-works containing fourteen printing machines and employing 600 men, most of the labourers being Hungarians, comparatively new immigrants. The largest machine was a 44-inch eight-colour reversible, the only one, I was told, in the United States; all the rollers were of solid copper, the largest about 19 inches in circumference, and they were not used after their circumference had been reduced below 15 inches. Nearly all the engraving was done by pentagraph machines of the flat-table pattern, at which the operators (all girls) can work seated. Only three hand-engravers were employed here, and most of their work, I think, consisted of touching up the rollers engraved by the pentagraph.

All the printing machines were driven by separate steam-engines except one or two which were being fitted for electric driving. One of the machine printers, who had formerly worked for Messrs. Potter at Dinting Vale, told me that he thought the colours worked better in America than in England, and that perhaps the drying was better. The printing machines ran faster than in England—from 50 to 55 yards a minute was their utmost, and they ranged from that down to 20 yards a minute—and they ran continuously from 7 a.m. until 5 p.m., with no stoppage at dinner-time. The wages of the machine printers were very

high—\$28 (£5 16s. 8d.) a week, as compared with £2 6s. in England; these men work fifty-eight hours a week, are paid 25 per cent. extra for overtime, and the Calico Printers' Union, to which they nearly all belong, requires the employers to pay half-wages during periods of idleness caused by the stoppage of the machine. No 'lurrier' (box-getter) was employed; the back-tenters went to the colour-shop and ordered fresh colour as it was needed, and this was brought by men from the colour-shop. Some of the orders in hand at the time of my visit were for 800, 1,250, and 2,000 pieces of a pattern—generally four 'ways,' or combinations of colouring, to each pattern. The largest order was for a pattern with close diagonal black lines and a light speckle on a coloured ground, in four 'ways'; this, I was told, was a regular annual order. The weekly production of these works is about 25,000 pieces of 50 yards each.

The second printworks which I had the privilege of seeing was a part of the Merrimack Manufacturing Company's great establishment at Lowell, Massachusetts. At these works 1,000 hands are employed; there are twenty-two machines, and the weekly production is from 30,000 to 35,000 pieces, the pieces being from 50 to 55 yards long. They print their own cloth, about 20,000 pieces of which are made by the company every week, and are also 'converters,' or, as we should say in England, jobbers, printing their customers' cloth to order. The working day here is ten and a half hours, and the machines never stop except to change colours or rollers. They do no sampling; the patterns are printed and the bulk run off continuously. A good day's work for a machine is 250 pieces, and the average run on one pattern is about 1,000 pieces, with from 200 to 250 pieces to one colouring, 540 pieces to one colouring being an exceptionally large number. I was told that they had printed as few as twenty pieces of lawn to one colouring, but that they did not care to accept orders to print less than 300 pieces in five or six 'ways,' although sometimes it was necessary to work on smaller quantities. Colourings were often changed two or three times a day, but seven changes of cloth per week and six changes of colouring per day would be about the maxima. The largest machine was a twelve-colour, and all the machines were

steam-driven. Ice was applied to the colour-boxes to keep the colours cool.

The stentering machine was completely enclosed, except at the ends, in a glass-house or chamber; the temperature inside the chamber was 175° Fahrenheit, and clips, not pins, were used to hold the edges of the cloth. The manager expressed a strong preference for the clips. Beetling machines made by an English firm were installed at these works, but I was told that they were little used now, because beetling is too costly a process for American conditions.

At the 'American' and 'Algonquin' works at Fall River (which I did not see) there are, I believe, thirty printing machines printing no less than 135,000 50-yard pieces of indigoes and shirtings a week. They practically control the market for indigoes, which are largely exported to South America. The 27-inch cloth, grey, sells for 3 cents a yard, and it is sold printed for 3½ cents.

The Manchester Printworks at Manchester, New Hampshire, are a department of the Manchester Mills, a huge manufacturing establishment of which I gave some description in an earlier chapter. They are under the direction of Mr. Schaeffer, a highly trained German chemist, who before coming to America had gained a thorough practical knowledge of calico printing in Alsace and in England. The works have just been completely rebuilt and rearranged with a view to the most economical and perfect working, and are probably unsurpassed in their general design and construction by any in the world. The buildings are of brick, five stories high, and contain 17 acres of floors laid with Georgia pine. The cost of the shell alone was \$370,000, and that of the buildings furnished with power and shafting was \$700,000. Power is derived both from the river and from steam, there being a 600-i.h.p. turbine and a 500-i.h.p. engine, by means of which electricity is generated for transmission through independent motors to the short lines of shafting and the machines. There were at the time of my visit seventeen printing machines, capable of a weekly production of from 23,000 to 25,000 50-yard pieces under the existing conditions, and three additional machines were being laid

down. The manager expected to run the whole plant with between 700 and 800 hands.

These numbers—600 hands to fourteen machines at Passaic, 1,000 hands to twenty-two machines at Lowell, and 700 or 800 hands to twenty machines here—seem large in comparison with English practice, for twenty-five or thirty hands per machine is, I believe, not an abnormally small number in England. But if the output of the printing machines instead of their number be taken as the basis of comparison, as of course it ought to be, the American works come out very much better.

The Manchester works print fine shirtings and dress goods only, varying in weight from 2 yards to 20 yards to the pound; most of the cloth is bought from other mills, and a small proportion only is made by their own mill. They engrave about 1,500 new patterns every year, and have a stock of about 6,000 copper rollers, most of them 40 inches long, and varying in circumference from 18 inches down to 13 inches. The engraving is done by twenty-five flat-table pentagraph machines, and four mill-engraving machines are used for fine work and small repeats. No pattern is ever engraved directly upon the copper rollers by hand; the only hand engraving done is the retouching of pentagraph work. I noticed that one of the pentagraphs was an English machine and that all the others were American; the English pentagraph, in Mr. Schaeffer's opinion, was a good machine, but unnecessarily complex in its mechanism. The simpler American machine, he said, would do all that was needed quite as well. The pentagraph engraving, retouched by hand, was remarkably clear and sharp, even in delicate and intricate patterns.

Each printing machine at Manchester has, besides the printer, a back-tenter and a third hand (a boy), who is usually a printer's apprentice. In addition there is one plaister-down to every three machines. Men from the colour-shop bring colour to the machines as required, and take away the empty colour tubs. The hours at Manchester are ten a day, and the wages are approximately—pentagraphers (girls), \$5.40 to \$6 per week; engravers, \$25 per week; printers, \$28 and upwards per week; dyers, \$10.50 to \$11 per week; labourers, \$8 a week. Printers' appren-

tices are paid \$7 a week for the first year, \$9 a week for the second year, and \$11 a week for the third year. Here, as at Passaic and Lowell, the machine printers receive a proportion of their pay when their machine is stopped, and the favourable conditions of their employment appear to be reflected in the fact that one of the Manchester printers was over eighty years of age, and several were over sixty. There are not many industrial pursuits in the United States in which men are not worn out and cast aside long before that age.

It is seldom that more than 200 pieces, or 10,000 yards of cloth, are printed to one order at the Manchester works, and the 200 pieces have, as a rule, to be printed in five or six different colourings. In sampling, two pieces of each colouring are printed and cut up for card patterns. Prices are graduated according to the quantity of a single pattern ordered, a system which encourages customers to take large quantities. By giving large orders the buyers enable the works to produce more cheaply, and they participate in the saving.

American printers, Mr. Schaeffer thinks, are badly handicapped by the faulty character of American cloth. He himself, he said, bought plain and fancy cloths from the best mills at New Bedford and Fall River, and ordered only 'perfects,' but when the goods came in he had to have them carefully examined and regraded into three classes—good, medium, and bad—and he rejected all but the 'good' unless a due allowance was made by the manufacturer. There had been a great improvement in this respect during the last two years, but American cloth was still far inferior to English. The product of one mill which I had visited he described as 'middling,' that of another as 'by no means up to the mark.' 'There are,' he affirmed, with conviction, 'as many faults in one yard of American cloth as in a whole piece of English—I have printed both.' The satisfaction with which English manufacturers may read this will doubtless be tempered by the reflection that the managers of print-works are not, as a rule, enthusiastic admirers of the cloth which they get to work upon, and that in the perspective of memory past troubles seem relatively small.¹

¹ The French labour delegates who visited the World's Fair at Chicago found a great number of faults in the cloth exhibited

But my friend the manager told me something else which was not less pleasant. 'The cost of producing prints, such as we produce here,' he said, 'is certainly not less in America than in England or on the Continent.'¹

American prints are sold wholesale in wooden cases, each case containing forty pieces (50 yards each) of assorted patterns, and no charge is made to the customer for the case or its carriage. I am told that the Americans export nearly 40,000 such cases of prints to Canada annually, notwithstanding the preference given by the tariff to English prints. The American exports to Canada are, I believe, chiefly

there, which they attributed to defective spinning (*Rapports sur l'Exposition de Chicago*).

¹ An English calico printer, writing to the *Manchester Guardian* on July 11, 1902, says: 'We are in this country in a better position than any other country for catering for the print trade of the world. Our wages are lower than in America, and a sovereign secures more labour here than on the Continent. On the whole, our drugs are cheaper than in America. Coal is cheaper with us on the average than it is either in America or on the Continent. Water-power is more in use elsewhere than here, but experiments in this direction have led me to doubt if there is much in this as applied to calico printing, steam being a necessary and a large factor for process altogether apart from power. The practical question appears to be whether the American system would not be a great saving as applied to large staple lines, particularly for Eastern demand. The millions of the East want our prints, but they must have them cheap, if at all. Demand can be stimulated by cheapness in supplying these enormous populations, and a large continuous demand will make low prices in printing profitable so long as the operations are conducted by skilful and prudent men. We have all the appliances and powers. It is a question of organization not only in production, but in distribution—two things which usually have been kept rigidly apart in this trade. To this, however, there are one or two exceptions, which are believed to have been successful. The Italians, who were formerly good customers for our prints, are now our competitors, and it is important to note that in a modified form they are conducting their export business on the American system. Of course, as beginners in Eastern trade, they are quite free to adopt whatever method may seem to be best; we here work by traditional methods which have grown with the trade. Present conditions seem to point to the fact that all this will have to be revised if we are to get good out of our great natural advantages and old-established connections.'

printed fancy goods and flannelettes, and their success in the Canadian market is doubtless due to the identity of taste in the two countries, which enables American printers to dispose of their surplus production in Canada at very low rates. The Canadian market for prints is surprisingly large, and there are two printworks in Canada with about a dozen machines and two or three more machines in course of erection. In what are called '10-cent prints' Great Britain still retains the Canadian market against both American and local competition, largely by virtue of superiority in patterns, and the importation of these goods amounts to about 250,000 pieces a year; but we have almost completely lost the cheaper trade, and the Canadian printers hope before long to cut into this better-class trade also. If the Canadian printer could buy his grey cloth as cheaply in Canada as it can be bought in England or the United States, we should probably soon be shut out altogether, but so long as he has to print English grey cloth which has paid a duty of $16\frac{2}{3}$ per cent., the advantage given to him by the duty on prints is considerably modified.

In a wealthy country no tariff can altogether exclude fashionable novelties in dress material, and I am disposed to think that by studying American tastes closely English calico printers could do a considerable trade with the United States themselves. There is a limited, but still a very good, sale in New York, Boston, Philadelphia, Baltimore, Washington, and Chicago for imported fabrics of novel design—fancy shirtings, for instance—almost irrespective of price. For as long a time as it takes the American manufacturer to copy these novelties they sell freely and command their own price, but when the domestic imitation appears in the market their 'run' is over and no modish person will look at them. It is all a matter of time, and there are Englishmen and Scotchmen in New York to-day who are exploiting with conspicuous success this American passion for imported novelties.

But, as an American salesman said to me, 'London and Paris colours will not do for New York. When you see them in our streets, with our white buildings, bright sunlight, and clear air, they look quite dim and dingy. We need stronger and much more decided colours.'

CHAPTER XIV

The relative efficiency of English and American operatives—
Assumption of American superiority not warranted—Relative
earnings and cost of living—Wages in New England actually,
as well as nominally, higher—Does the American work harder?
—Wages of women in the two countries—Higher standard of
living the result of technical progress.

RESPECTING the American labourer and his wages, it is generally believed in England that the American workman works much harder than the Englishman, and that, whilst he earns better wages, everything costs so much more than in England that in reality he is not much better off. Americans themselves, whose knowledge of British industry is often derived mainly from anti-trade-union articles in London newspapers, assume almost as a matter of course that the American workman is superior to the British workman in efficiency and industry, and if you ask such an American how he accounts for the fact that the British workman in America is amongst the very best, and is often chosen for promotion to positions of responsibility, he will say, 'Because he is not restricted by trade-unions,' or, 'Because we get your best and most enterprising men,' or, 'Because our social atmosphere is more conducive to sobriety and industry.'

Even so impartial and acute an observer as Mr. Charles B. Spahr, of the *Outlook*, has, as I think, been misled on this point. From his recent book on 'America's Working People'¹ I quote the following passage:

'The one manufacturer [in Massachusetts] who did talk to me about English labour put in the strongest kind of terms its inferiority. "An American weaver," he said, "can handle

¹ Pages 29, 30.

eight looms where an English weaver handles four." I told him that some Scotch and English weavers I had talked with had said that there was just that difference between the work they did in the old country and here, and I asked how he accounted for it. "The English workman is too beer-soaked," he said, "to look after more than four looms. The sentiment here," he continued, "is against drinking, and those who come over learn to meet our expectations." I doubted whether this was the whole explanation, and thought of the brilliant passage in Henry Adams's "History of the United States" where he says that in the earliest days of the Republic it was a constant miracle to our foreign critics how the newly-landed immigrant was changed into a new man by the hopes and ambitions which this country awakened in him. Be the explanation what it may, there is no doubt about the facts. American weavers turn out nearly twice as much work a day as their English competitors, and their wage per piece is absolutely a little less. It is not strange, therefore, that the New England manufacturers who are shipping large quantities of cotton abroad have ceased to talk of the cheap labour of Old England.'

Now, leaving the Southern States out of account, for factory life there is in a very early stage of development, I think that this common belief is on the whole mistaken. I am by no means convinced by what I have seen and heard that, in the cotton industry at any rate, the American operative works harder than the English or is more efficient; on the contrary, I am satisfied that the standard of skill is considerably higher in Lancashire than in New England. There is no doubt that the wages earned in the New England mills, especially for all operations subsequent to spinning (except slashing), are higher than in Lancashire mills, but I am not satisfied that for the necessities of life (except his house or lodging) the American workman has to pay on the whole higher prices than the Englishman. That is to say, I do not think that such articles of food, clothing, and furniture as the Lancashire workman buys with his wages are, taking them altogether, dearer in America.

If this be true, it follows that 'real' wages—that is, the quantity or quality of necessities, conveniences, and luxuries which the nominal or money wages will procure for their

recipient—are on the whole higher in New England than in Lancashire.

The assumption that, because an American weaver runs eight looms where an English weaver runs four, he or she works twice as hard or does twice as much work is unwarrantable, inasmuch as it ignores, amongst other things, the speed of the looms, the comparative strength and liability to breakage of the warp-threads, the duties other than weaving performed by the weaver, and the percentage of the theoretical maximum of production which the employer may happen to require from each loom. The eight looms of the American weaver run from 15 to 25 per cent. slower than the four looms of the Lancashire weaver, which means that less labour is needed to keep the shuttles supplied with weft; the warps are stronger, which means less labour in finding and tying broken threads; and the American weaver, unlike the English weaver, does nothing but weave; the weft is brought to the looms, the woven cloth is taken away, and all sweeping, oiling, and cleaning are, as a rule, done by persons specially employed for the purpose. Any Lancashire weaver who was not an absolute cripple could run ten, twenty, or, I suppose, even fifty, looms if perfect cloth and a certain minimum output from each loom were not required. The number of power-looms run by a weaver is, in practice, determined, not by the weaver, but by the employer, whose first care is that the capacity of the looms shall be fully exploited. I have watched the American weaver running eight ordinary looms, ten looms with warp-stop motions, twelve Harriman looms, or twenty Northrop looms, and I am sure that as much energy, dexterity, and watchfulness are demanded from the four-loom weaver in England.

As to the relative skill of British and American weavers, I have heard Lancashire manufacturers, who were much better judges than myself, speak in most disparaging terms of the weavers in some of the foremost mills in New England. Who, after all, is the American weaver of whom we are talking? He or she in the Northern mills is, oftener than not, a French Canadian, a German, an Italian, a Hungarian, an Albanian, a Portuguese, a Russian, a Greek, or an Armenian. Lancashire folk at least will be slow to believe that in their own hereditary crafts of spinning and

weaving they are inferior to people of these races, many of whom are, comparatively, novices.

If England is deficient, it is not in the quality of the native labour, but in the administrative skill which applies the labour to the task. I have heard an intelligent American say that English methods in weaving were 'wasteful of labour,' meaning that in England skilled weavers were required to spend a considerable part of their time in doing things which might be done as well and more cheaply by machinery or by unskilled assistants. And I think he was right.

That competent workpeople are, on the whole, more highly paid in the New England cotton mills than in Lancashire, where 24s. a week is an average rarely exceeded by good four-loom weavers, has, I think, been made tolerably clear by my earlier chapters. Although the wages in the American cotton industry are kept down by immigration, the piece rates in Massachusetts are at present fixed on such a basis that an eight-loom weaver can earn from 45s. on plain, to 50s. on fancy, goods per week. Rovers can make anything up to 48s., ring spinners 32s., drawers in 40s., and warpers 38s. In weekly wages 'boss pickers' are getting 48s., grinders 45s., strippers 36s. 6d., labourers 30s., and loom-fixers nearly £3. These are the earnings of the best hands; but the United States census of 1890 showed that the average weekly wages in Massachusetts were remarkably good. I give the figures, as calculated by Mr. North, for Massachusetts and other Northern States, together with those for the three most important cotton-manufacturing States in the South:

AVERAGE WEEKLY WAGES IN COTTON MILLS, 1890.

		Males.		Females.	
		\$		\$	
Massachusetts	...	8'05	...	5'89	
Maine	...	7'52	...	5'68	
New Hampshire	...	7'56	...	5'83	
Connecticut	...	7'68	...	5'69	
Rhode Island	...	7'99	...	5'70	
New York	...	7'62	...	6'25	
Pennsylvania	...	9'71	...	6'42	
Georgia	...	5'75	...	4'55	
North Carolina	...	5'25	...	3'21	
South Carolina	...	5'17	...	3'90	

Compared with these figures, the wages of women engaged in the English cotton industry are small. In 1886 a Board of Trade investigation showed that the average wage of women in the cotton trade was 15s. 3d., and Miss Collet, in her report for 1894, prepared under the direction of the Board of Trade, showed that the weekly earnings of women in the cotton mills of Lancashire and Cheshire were as follow :¹

Less than 10s. a week	...	...	10·7 per cent.
From 10s. to 15s. a week	...	...	44·9 "
" 15s. to 20s. "	...	...	32 "
" 20s. to 25s. "	...	...	12·1 "
Over 25s. a week	...	...	3 "

So much for the nominal wages ; now for the real wages—their purchasing power. Rent is undoubtedly a more serious item in New England than in Lancashire, and I am at a loss to know why it should be so, for in the neighbourhood of most of the mills there is plenty of unoccupied land, and building material is cheap. Perhaps it is because wooden houses depreciate more rapidly and cost more to insure against fire than houses of brick or stone. In any case, where the Lancashire workman would pay from 4s. 6d. to 6s. a week for his house, the American pays about 10s., and I am not sure that he is better housed then. Fuel and light cost about the same in New England as in Lancashire, and although the American winter is colder, ours is damper and darker. Food, as I have shown in an earlier chapter, is not dearer in American factory towns than in Lancashire, and I do not believe that there is any appreciable difference in the cost of clothing such as working people wear. In the shops of New Bedford I noticed strong boots at \$1 and \$1½ a pair, coloured cotton shirts at 39, 48, and 50 cents each, trousers at 8s., and good suits at 40s. A shop in one of the principal streets of Boston offered suits of 'Yorkshire' and 'West of England' cloth at 50s., made to order. Machine-knitted hosiery can also be bought cheaply ; excellent machine-made furniture costs

¹ In the spinning mills of France, according to M. Levasseur, the earnings of women are 2 francs 45 centimes, or a trifle less than 2s., a day.

less than in England, and all kinds of ironmongery and household utensils (except, perhaps, crockery) are quite as cheap as with us.¹

The Aldrich Reports on retail and wholesale prices, brought down to 1899 by Professor Falkner, show that, whilst wages had greatly increased since 1840, the average price of food, although it had fluctuated in the meantime, was practically no higher, and had fallen 15 per cent. since 1891. The cost of other commodities had fallen very considerably, and the net result of the two movements—upwards in wages and downwards in prices—was that 'real' wages had risen by about 130 per cent.

The most important difference between the value of money in America and in England is in what that distinguished French economist, M. Levasseur, has called its 'social power,' or the social position that may be maintained with a given amount of money. With the increase of general affluence the social power of money diminishes, and the social power of money in New England is, I should say, distinctly less than in Lancashire to-day. In this sense, and in this sense only, it is true that living is dear in the United States, and that, although the American earns better wages than the English weaver, it costs him more to live.

There is a higher standard of living amongst American mill hands than amongst those of Lancashire, a standard more nearly that of what is called the 'lower middle class' in England than that of the working class; for the American, having the control of a larger income, has developed a wider range of tastes and wants, the satisfaction of which costs him as much as he can earn. He dresses better, eats more varied and expensive food, travels more, and reads more. He does not stop to consider whether he can afford small sums—5-cent car fares, 5 cents for having his boots polished, and a score of trivial but frequent expenditures of the same kind. He visits the barber more than once a week, and I dare say he has a laundry bill. It was habits like these that the Darwen weaver at Fall River had in his mind when he told me

¹ Mr. Andrew Carnegie, in 'The Empire of Business,' pp. 245-260, gives facts which bear out my contention.

that many weavers there 'flung their money about.' As M. Levasseur has truly said, the immigrant at first thrives upon the change.¹ Perhaps he accepts a reduced wage, but he quickly puts himself in touch with the new conditions. He spends more than he did at home, but it is because he desires to, and because he must adjust his way of living to a higher standard in order not to be looked down upon by his fellows. In the end he does not find it much easier than before to live within his income. To live as his neighbours do requires nearly all he earns. But although he may in time cease to be sensible of it, he is, in fact, very much better off than formerly.

How is it, then, that the cotton-mill operatives of New England, although less skilful and not more industrious than our own, are able to enjoy this higher standard of living? The answer—confirmed by the history of Lancashire itself—is contained in one sentence of Dr. S. von Schultze-Gaevernitz's book on 'The Cotton Trade in England and on the Continent,' which I shall quote: 'Technical progress in connection with an increase of labour capacity'—or, to put it in another way, the introduction of machinery and methods which cheapen production and economize labour—'accomplishes a permanent lowering of piece wages, at the same time raising the weekly earnings of the operatives and gradually shortening the hours of labour.'

¹ 'The American Labourer,' p. 433.

CHAPTER XV

American methods of management—Their 'Unknown God'—English inventions adopted first in America—Economic environment favourable to mechanical progress—Lancashire manufacturers and new inventions—The spirit of enterprise more important than any machine—Automatic looms, and what may be expected from them in England—High first cost an obstacle—Trade-unions and the new looms—Labour has everything to gain and nothing to lose.

‘OUR only chance of national prosperity,’ said Cobden, ‘lies in the timely remodelling of our system, so as to put it on an equality with the improved management of the Americans.’ There remains a great deal of truth in these words for those—masters and men’s leaders—who control the conditions of the English cotton industry to-day, and if I were asked to attempt in a single sentence a definition of ‘the improved management of the Americans’ as I have seen it in their cotton mills and printworks, I should say it is this : Unceasing study and close analysis of the costs of production, and unresting endeavour to diminish any and every element in them by any departure from existing routine, or by any outlay of additional capital which close calculation may show to be probably advantageous.

I am well aware that every intelligent manufacturer would claim this as his own method, and of course it is the only method by which any producer can keep abreast of his competitors. I am far from suggesting that the Americans have any monopoly of it. But to follow it successfully a trained intelligence, an untiring energy, a complete freedom from the trammels of tradition, and a certain bold though calculating adventurousness, are necessary ; these the

American has in a high degree, or if he has them not he hires them.

The practical managers of the larger American mills are very highly paid; some of them receive as much as £3,000 a year; but they would be displaced in favour of managers at £4,000 a year if the latter could effect economies more than equal to the additional salary. The same rule obtains all through commercial life in America, and there, I think, more than here, men in the higher positions are paid not 'as little as they will take,' but, rather, 'as much as they can prove that they are worth.' The result is that Americans generally, and American mill superintendents in particular, are like the Athenians to whom St. Paul preached, except, perhaps, that they are more anxious 'to hear' than 'to tell' some new thing. The Unknown God to whom they set up their altar is the next new idea or invention which shall enable them to reduce their cost of production and obtain an increase of salary. It is this which makes America the inventor's paradise and keeps her industries in the van of technical progress, which explains partly why the principle of the warp-stop motion, invented in England three-quarters of a century ago; the idea of automatically renewing the supply of weft, which was hit upon by Rossetter forty years ago; the electrical warp-stop motion devised by a Bradford man; the famous automatic loom invented by James Northrop of Keighley, and many another English invention, have all been practically applied and developed and exploited in America.

I say that the superior receptivity of the American mind and the American's greater enterprise 'partly' explain these things because I think that the whole explanation is as much economic as psychological. As M. Levasseur has said, 'The inventive genius of the American has certainly been stimulated by the rate of wages. The higher the price of labour, the greater will be the effort of the entrepreneur to economize in its use. Moreover, when machinery has made the labourer more productive it is possible to pay him a higher wage. An increase of \$1 distributed over 100 units of product means an increase of only 1 cent per unit; distributed over ten units it causes a rise of 10 cents in the price per unit. A manufacturer considering the pur-

chase of a machine which will cost \$10,000 and replace four labourers, but which must pay for itself in ten years, will not hesitate to make the purchase in a country where wages are \$500 per annum. A manufacturer in a country where wages are \$200 cannot use the machine, however, because it would cause an annual loss of \$200.' An example is afforded by a tabulating machine which was used with economy and success in preparing the reports of the eleventh census at Washington, where wages were \$2 and \$2.50 per day; whilst at Vienna and Rome, where wages are much lower, experiments with the same machine were not so encouraging.

Some English manufacturers are, of course, more intelligent and more enterprising than many Americans, but when every allowance has been made for the differences in their situations the conclusion is hard to resist that the average English manufacturer is more conservative—more cautious, if you will—and more liable to reject a good thing because it happens to be new and hitherto untried, than the average American manufacturer. The English inventor of an important improvement in textile machinery has given me the following account of his experience:

The attitude of Lancashire manufacturers towards novelties is decidedly sceptical. Each wants to see the new thing well tested by somebody else before he tries it. Six years ago the average small manufacturer regarded anyone who approached him to urge the adoption of a new kind of machine with pity. He looked upon you as a crank, a person with a 'bee in his bonnet,' and if you tried to argue with him he would not listen to your reasons, but would, as likely as not, turn on his heel and leave you talking. But now there is a great change. Now such a man will listen to you—for a moderate time—and say that no doubt your invention is 'bound to come,' although he himself will not, except in rare cases, do anything to assist its coming. But by degrees conditions more favourable to inventive enterprise are being created. Inventors, however, cannot live on air. I have had one or two mouthfuls of it, and I found it not very nourishing.

Then, he continued, when the stage of practical trial is at last reached, how different the English method is from

the American! When the American mill superintendent has made up his mind to try, say, a new automatic loom, and has obtained permission from his directors, he tries it thoroughly. He puts in 50, 100, or 200 looms, and having done so he recognises that his reputation is more or less staked on their success. If any defects or difficulties appear in their working, he applies all his resources to overcome them, and he watches very closely to see that everybody else who has anything to do with them tries to make them a success too. The result, in nine cases out of ten, is that the preliminary hitches are overcome and success is achieved. The English manufacturer, on the other hand, will put in, or allow you as a favour to put in, four or eight looms; probably everybody in the place will regard them with suspicion, every hitch in their working will be set down against them as an inherent defect, and perhaps in the end they will be thrown out as useless, and the manufacturer will see in their 'failure' merely a justification of his reluctance to have anything to do with them. In the meantime his more wideawake competitor may have taken the same imperfect machine, nursed it into practical efficiency, and may be making money by it. For every new invention, as a recent writer has aptly said, 'has its infancy of weakness and failure, its adolescence of partial adoption and doubtful success, and its manhood of completion and achievement. Unfortunately, the natural conservatism of human nature is apt to deride the early failures and to prejudice the invention so as to delay its adoption.'

I have dwelt at some length upon this contrast between the spirit in which the American and the English manufacturer apply the principles of sound business management, because I believe that herein lies the most valuable lesson which the Americans can teach us. If that is once thoroughly learned, all the rest will follow naturally. Without it, we may adopt this or that automatic loom in a half-hearted fashion and make other minor changes in our methods without being much better off than we are to-day. It is no part of the object of this book to advocate the merits of any one of the various labour-saving machines which the writer has seen successfully employed in America, and the writer would even warn his readers to remember that, as in the case of

the tabulating machine already mentioned, the value of such appliances often depends upon their economic environment. But some readers might be disappointed if no attempt were made to indicate, however roughly, the saving that might be effected by American automatic looms in Lancashire.

It should be borne in mind that they are plain looms and are best adapted for weaving the coarser and simpler fabrics. Before giving my own calculations, I may say that an English sheeting manufacturer of my acquaintance, whose weavers run on the average three ordinary looms each, estimates that 1,100 Northrop looms would produce as much cloth as 1,000 ordinary looms, and could be run at a saving in wages, after allowing for interest and depreciation, of £9,984 per year of fifty-two weeks, or £9 per loom. He assumes that one weaver will run twenty of the automatic looms. It seems a good deal to expect of the Northrop loom that it shall produce only 10 per cent. less cloth in a given time than the fast-running Lancashire loom, for it has been found in America that 160 picks a minute is about the most economical speed for the 32-inch Northrop loom, and 185 picks for the 44-inch. Then, even if the figure of £9 per loom per annum be accepted as approximately accurate, it must be subject to considerable deductions for extra tackling and stores (there being 10 per cent. more looms to be looked after, and all being more elaborate machines); for extra labour to perform duties other than weaving, now performed by the three-loom weaver, but hardly to be expected from a twenty-loom weaver; for extra rent (or its equivalent), power, insurance, rates and taxes; and, probably, for an improved quality of warps to withstand the action of the warp-stop mechanism and reduce the number of warp breakages. Then, when all other deductions have been made, it is prudent to reduce the remainder by 15 per cent. as representing the 'margin of disappointment.'

The following calculation, made independently by myself, is offered as what the Americans call a 'conservative' estimate. It may err in the direction of caution; I do not suggest that it would be impossible to obtain a better result than it shows, for it is an endeavour to indicate the minimum saving that might be looked for. Here it is:

Sixteen ordinary looms running at 220 picks per minute,

85 per cent. effective for fifty-four hours a week, put in 187 picks per loom per minute, and, at 64 picks to the inch, produce 263 yards of narrow print-cloth per loom per week; total production for the sixteen looms, 4,208 yards of cloth. The weavers' wages, each weaver having four looms and earning 6s. a week with each loom, will be 24s. each, or 96s. in all.

Twenty Northrop looms running at 165 picks a minute, 90 per cent. effective, would put in 149 picks per minute each and produce 209½ yards of cloth per loom per week, or, for the twenty looms, 4,190 yards. They could be run by one weaver, and for the purpose of the comparison it may be assumed that his wage-basis is 30s. a week, or 25 per cent. more than the wage-basis of the four-loom weaver. I assume further—and here I make a provision which has not been found necessary in all cases in America—that a young person is employed at the wage of 6s. a week to assist the weaver in keeping the magazines supplied with weft. There remains a saving of 60s., from which I shall make the following deductions for extra expenses :

	£	s.	d.
Interest and depreciation for one week at 15 per cent. per annum on additional capital expenditure, viz., £22 per loom on sixteen looms (being the estimated difference in cost of automatic and ordinary looms), and four extra looms at £30 each—total, £472	...	1	8 4
Extra tackling and stores ...	...	0	5 10
Extra cost of wraps (¼d. per pound)...	...	0	6 8
Total ...	...	£2	0 10

Deduct this from £3 (the saving in wages), and there remains 19s. 2d. per week for the twenty looms, or, say, £2 19s. 11d. per loom per annum (fifty weeks) for each of the sixteen looms displaced, or for the equivalent of a shed of 1,000 common looms, £2,995 16s. 8d. From this must be deducted a proper allowance for the power required to drive 25 per cent. more looms and for the additional rent, insurance, rates and taxes, and from the remainder write off 15 per cent. as the 'margin of disappointment.'

Suppose that ordinary looms were already running, and it were decided to break them up and put in automatic

looms of the Northrop type, it would then be necessary to provide for interest and depreciation on the entire cost of the twenty looms—say £600—which would come to 36s. a week, reducing the net saving to 11s. 6d. per week for the twenty looms. The saving would be increased in proportion as the effective speed of the loom was increased. In my calculation the cost of the Northrop loom is estimated at £30 (the price given to me in America), and the week is reckoned as one-fiftieth of the working year.

One weaver often runs more than twenty looms in the United States, but the average for a whole shed of 32-inch looms is not, I think, often more than fifteen. In fixing twenty as the number in the calculation above, I have taken into account the superior average efficiency of Lancashire weavers, the shorter hours of work, the low speed of the looms, and the fact that provision is made for an assistant. This practically reduces the number of looms to ten per operative, and is, I think, a liberal allowance for any extra labour involved by more frequent warp-breakages and the use of cops instead of ring weft. The makers claim that where there are from ten to fifteen warp-breakages per loom per day, and the weft runs for five minutes without changing, one American weaver can run twenty or more Northrop looms. If there are twenty-five breakages a day the weaver can run about fifteen or sixteen looms, and if there are thirty-five breakages ten looms. With mule-cop weft, they say, the capacity of the weaver is about two looms less than with ring-bobbin weft, on account of the time taken in skewering the cops.

The following is another 'conservative' calculation, showing the saving that might be effected by the use in a Lancashire weave shed of the Harriman loom, the typical American shuttle-changing loom. The movement of this loom is momentarily arrested when the shuttle is changed, and it is claimed that the loom can run as fast as any ordinary loom. I have, however, for the purposes of this comparison, put its speed at 10 per cent. less than that of the ordinary Lancashire print-cloth loom. I am told that the loom will probably be sold in England at about the price which I have assumed, and that it will be possible to apply the shuttle-changing mechanism and warp-stop

motion to existing looms at something like the cost indicated.

Twelve Harriman shuttle-changing looms, running at 200 picks a minute, 90 per cent. effective, would put in 180 picks per minute each and produce 253 yards of cloth per loom per week, or 3,036 yards for the twelve looms, as compared with 3,155 yards for twelve of the common looms. On the common looms three weavers, with four looms apiece, will earn 72s. per week, whilst one weaver at, say, 30s., and a tenter at 6s. (here, again, more labour is provided for than is customary in America) should suffice for the twelve Harriman looms. This leaves a difference of 36s. in favour of the latter. Assuming the price of the shuttle-changing loom with warp-stop motion to be £25, and the cost of converting a common loom to be £15, the extra expenses will be as follows:

	£ s. d.		
Interest and depreciation at 15 per cent. per annum on cost of converting twelve looms at £15 (£180)—one week	0	10 10
Extra tackling	0	2 6
Extra cost of wraps	0	5 0
Add cost of weaving 119 yards of cloth, being difference in production of looms, say	0	3 6
Total	£1	1 10

Net saving 14s. 2d. per week for twelve looms, or £2 19s. per loom per annum—fifty weeks—or for a shed of 1,000 looms £2,950. Deduct, as before, 15 per cent. for possible disappointment.

It should, of course, be borne in mind that, in so far as these results depend upon an increase of 25 per cent. in the wages for the automatic loom weavers, they are purely conjectural. What the wage-basis may be—whether this, or more or less—will, I conceive, have to be settled by the two parties to the bargain when the time comes. But it is obvious that until the price of the automatic looms is materially reduced the gain to be shared between labour and capital will be strictly limited. It will be noticed that in all these calculations a considerable part of the saving in labour cost is neutralized by the increased provision for interest and depreciation. This is due to the high initial

cost of the looms, the price of which in America is based not on the actual cost of making them so much as on the price that cotton manufacturers can pay without losing the inducement to use them. Whether Lancashire manufacturers can afford to pay as much is questionable, but it is certain that unless they can see a substantial and assured profit they will not be induced to make any large outlay of capital on new machinery. There is, however, more than one promising English automatic loom being prepared for the market, or already upon it, whose competition will doubtless have its natural effect upon prices.¹

Two important questions remain—the first commercial, the second industrial.

‘Can the automatic loom produce cloth saleable on the Manchester market?’

The answer is that it already produces in America cloth which competes successfully with ours in the East, and there is no reason to suppose that it cannot be so modified as to produce the cloth that Manchester buyers want.

‘How will the trade-unions regard the introduction of labour-saving machinery?’

That remains to be seen; but unless the Lancashire weavers belie their reputation for sagacity they will welcome any appliance which will raise the standard of wages by 25 per cent. or thereabouts.

But what of the weavers who are displaced? No doubt, if automatic looms were installed throughout England simultaneously in place of the existing looms, many weavers would be thrown idle until cheapened production had so stimulated the demand for woven goods that new mills would have been built to cope with it. But the change will not come suddenly. Even in America, where changes are so much more rapid than here, this one has come by degrees, and is yet far from complete. There, as I have shown, although 85,000 automatic looms are running, the demand for weavers is greater than ever. In America, as elsewhere, the proportion of labourers to the whole population has actually increased concurrently with the change from hand to machine labour. Between 1860 and 1890 the population doubled, the number of persons engaged in manufactures

¹ See Appendix.

was nearly tripled, and the motive power employed was quadrupled. Between 1850 and 1890 our own motive power in England increased more than sevenfold, and our population by more than ten millions. America and Great Britain are to-day the greatest machine-using countries in the world, and nowhere else is the general condition of the workers so good, except in undeveloped colonies, where also machinery is largely used. The weavers, then, should welcome rather than fear the automatic loom; in one form or another it is, I believe, one of the instruments by means of which, with intelligent and enterprising management, the English cotton industry can not only stall off the challenge of American competition, but even regain the clear lead that has been lost.

APPENDIX

THE newly-awakened interest in mechanical devices for reducing the labour cost of weaving appears already to be stimulating the inventiveness of British machinists. Several ingenious attempts to transfer from the weaver to the machine the task of changing the shuttle and restarting the loom have recently been brought under public notice by different makers of textile machinery in Lancashire and Yorkshire, but none of them contains greater promise of practical utility than a self-shuttling loom which is about to be put upon the market by Messrs. William Dickinson and Sons, Limited, of Blackburn. An opportunity of seeing this loom at work has been afforded to me since my return from America.

In its general outlines it closely follows the ordinary type of Lancashire loom; it has a loose reed, the picking is done from above the sley (instead of from beneath it, as in the American looms), and the crank arms are as long as in any ordinary loom, thus leaving plenty of room for all the shafts necessary for weaving such goods as satteens and drills. Like all other English automatic looms, it changes the shuttle, and not merely the weft in the shuttle, when a fresh supply of weft is required; and this change is effected, not when the loom is running at full speed, but during a momentary pause. It was weaving a common shirting, with ordinary Blackburn warp and weft, in a dry atmosphere at 210 picks a minute, and the shuttle-changing mechanism was working with absolute smoothness and precision. The absence of any jarring impact and the simplicity of the working parts were particularly noticeable.

It is difficult without the aid of diagrams to explain the mechanism by which the shuttle is changed, but the following description may serve to indicate its character. The loom has three pulleys—a fast pulley, which drives it at its normal speed, a loose pulley, and between these two a changing pulley, which, when the strap is on it, drives the loom five and a half times slower than its normal speed, and brings into play a series of clever mechanical devices at the other side of the loom. As soon as the weft-fork engages the weft-hammer (by reason of the absence of weft), the picking motion at the right-hand side of the loom is suspended, the cloth ceases to be taken up, and the loom runs on by its own momentum for three picks, when, with the help of a brake, it comes to a standstill. In consequence of the cessation of the picking motion at the right-hand side of the loom the shuttle always comes to rest at that end of the sley, and opposite to the back of the right-hand shuttle-box is a magazine containing seven shuttles filled with weft.

The following cycle of movements at the right-hand side of the

loom (which, be it noted, is now being driven slowly by the changing pulley) now takes place: A hinged wooden stop-buffer attached to the front frame of the loom, and hitherto held up clear of the shuttle-box by a spring, is drawn down, so that when the sley comes forward the wooden stop-buffer is struck by two spring buffers on the shuttle-box, and these, being driven in, push the spent shuttle out at the back of the box, leaving the back of the shuttle-box open. As the sley returns towards the back-centre the spring buffers come out again, leaving the box clear and empty. In the meantime, as the sley is travelling back, a new shuttle, which has dropped down from the magazine on to two steel bars or needles that are moving forward to meet the sley, is pushed into the empty shuttle-box, and the back of the box is closed. This happens when the sley is at its back-centre, and simultaneously with the closing of the box the strap is brought back to the fast pulley. Not until after the loom has run for three-quarters of a revolution at full speed does the picking recommence.

The pulling down of the wooden stop-buffer, the pushing in of the new shuttle, and the closing of the door at the back of the shuttle-box, as already described, are done by rods and levers set in motion by the tappet shaft. On this shaft are two collars, one made fast to it by a couple of small set-screws, the other loose, with a deep worm or spiral groove cut in it, and separated from the fast collar by a stout spiral spring. When the driving strap is on the changing pulley, a bolt is made to engage the worm on the loose collar, so that a lateral motion is set up, which first brings a brass fang on the fixed collar into contact with the rod that pulls down the stop-buffer, and afterwards brings a bowl, also on the fixed collar, into contact with the levers that push in the new shuttle and close the box. All this, which takes so long to describe even imperfectly, is done almost imperceptibly within a very few seconds. The pause in the running of the loom is, as has been said, only momentary.

The loom will, I understand, cost about £16 for the 40-inch size, and the cost of converting ordinary Lancashire looms will be about £9 each. The inventors are two Blackburn men—namely, Mr. Talbot, who has worked as a loom-maker in America and other foreign countries, and Mr. William Rossetter, son of the William Rossetter who invented the first automatic loom forty years ago. Mr. Rossetter the elder had three patents for automatic looms, one of which was taken up by the late Mr. Colin Mather, of Manchester, and another by Messrs. Howard and Bullough, of Accrington, whilst the third he worked himself. But his inventive genius was too far in advance of his time; it is only now that the value of such inventions is beginning to be recognised in England.

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CONTENTS

	PAGE		PAGE
General Literature,	2-20	Little Galleries,	27
Ancient Cities,	20	Little Guides,	27
Antiquary's Books,	20	Little Library,	27
Arden Shakespeare,	20	Little Quarto Shakespeare,	29
Beginner's Books,	21	Miniature Library,	29
Business Books,	21	Oxford Biographies,	29
Byzantine Texts,	21	School Examination Series,	29
Churchman's Bible,	22	School Histories,	30
Churchman's Library,	22	Textbooks of Science,	30
Classical Translations,	22	Simplified French Texts,	30
Classics of Art,	23	Standard Library,	30
Commercial Series,	23	Textbooks of Technology,	31
Connoisseur's Library,	23	Handbooks of Theology,	31
Library of Devotion,	23	Westminster Commentaries,	32
Illustrated Pocket Library of Plain and Coloured Books,	24		
Junior Examination Series,	25	Fiction,	32-37
Junior School-Books,	26	The Shilling Novels,	37
Leaders of Religion,	26	Books for Boys and Girls,	39
Little Blue Books,	26	Novels of Alexandre Dumas,	39
Little Books on Art,	26	Methuen's Sixpenny Books,	39

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